多位业界专家联合推荐
来自一线开发者的实战经验总结

Redis
入门指南

（第 2 版）

李子骅 编著

真正**零基础**入门，**深入浅出**全面剖析 Redis
任务驱动式学习，**轻松掌握** Redis 实战知识

人民邮电出版社
POSTS & TELECOM PRESS

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- [illegible]Redis [illegible]
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- [illegible]Redis [illegible]
- [illegible]

```
$ redis-cli PING
PONG
```

- Redis[illegible]

```
redis> SET foo bar
OK
```

- [illegible]

```
var redis = require("redis");
var client = redis.createClient();
//[illegible] JSON [illegible]
client.mset(
    'user:1', JSON.stringify(bob),
    'user:2', JSON.stringify(jeff)
);
```

[illegible]

[illegible]Ruby[illegible]PHP[illegible]

```
def hsetnx($key, $field, $value)
    $isExists = HEXISTS $key, $field
    if $isExists is 0
        HSET $key, $field, $value
        return 1
    else
```

```
return 0
```

[illegible]$[illegible]Redis[illegible]print[illegible]$[illegible]

[illegible]

[illegible]5[illegible]

[illegible]GitHub[illegible]https://github.com/luin/redis-book-assets[illegible]GitHub[illegible]

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[illegible]Redis[illegible]Redis[illegible]

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VMware[illegible]2010[illegible]Redis[illegible]Salvatore Sanfilippo[illegible]Pieter Noordhuis[illegible]3[illegible]5[illegible]VMware[illegible]Redis[illegible]

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1.2 [illegible]

[illegible]Redis[illegible]

1.2.1 [illegible]

[illegible]dict["key"] = "value"[illegible] dict [illegible]"key"[illegible]"value"[illegible]

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- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible] MySQL[illegible]post[illegible]

post["title"] = "Hello World!"

post["content"] = "Blablabla..."

post["views"] = 0

post["tags"] = ["PHP", "Ruby", "Node.js"]

[illegible][5][illegible]3[illegible] Redis [illegible] Redis [illegible] Redis [illegible]

[illegible] Redis [illegible]Redis[illegible]3.5[illegible]“[illegible]A[illegible]B[illegible]C[illegible]”[illegible]

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[illegible]Redis [illegible]

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SELECT title FROM posts WHERE id = 1 LIMIT 1

□□□□□□Redis□□□□□□□post:1□□□□□□□title□□□□□□□□□□□□□□□□□□

HGET post:1 title

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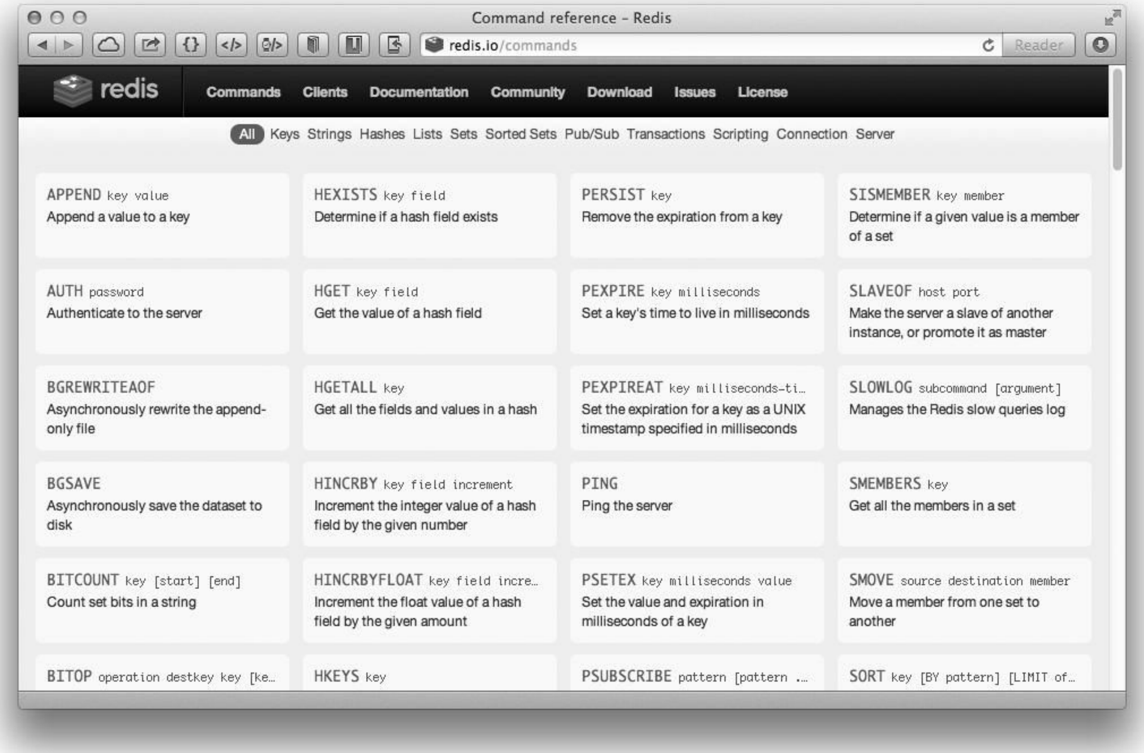

APPEND key value
Append a value to a key

HEXISTS key field
Determine if a hash field exists

PERSIST key
Remove the expiration from a key

SISMEMBER key member
Determine if a given value is a member of a set

AUTH password
Authenticate to the server

HGET key field
Get the value of a hash field

PEXPIRE key milliseconds
Set a key's time to live in milliseconds

SLAVEOF host port
Make the server a slave of another instance, or promote it as master

BGREWRITEAOF
Asynchronously rewrite the append-only file

HGETALL key
Get all the fields and values in a hash

PEXPIREAT key milliseconds-ti…
Set the expiration for a key as a UNIX timestamp specified in milliseconds

SLOWLOG subcommand [argument]
Manages the Redis slow queries log

BGSAVE
Asynchronously save the dataset to disk

HINCRBY key field increment
Increment the integer value of a hash field by the given number

PING
Ping the server

SMEMBERS key
Get all the members in a set

BITCOUNT key [start] [end]
Count set bits in a string

HINCRBYFLOAT key field incre…
Increment the float value of a hash field by the given amount

PSETEX key milliseconds value
Set the value and expiration in milliseconds of a key

SMOVE source destination member
Move a member from one set to another

BITOP operation destkey key [ke…

HKEYS key

PSUBSCRIBE pattern [pattern …

SORT key [BY pattern] [LIMIT of…

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[1]. http://merzia.com
[2]. http://lloogg.com
[3]. http://news.ycombinator.com/item?id=4833188
[4]. https://github.com/antirez/redis

[5]. [illegible]
[illegible]http://tagging.pui.ch/post/370277 45720/ tags-database-schemas[illegible]

[6]. Redis [illegible] Pieter Noordhuis [illegible]
https://gist.github.com/348262[illegible]

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2.1.1 □POSIX□□□□□

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```
wget http://download.redis.io/redis-stable.tar.gz
tar xzf redis-stable.tar.gz
```

```
cd redis-stable
make
```

Redis[illegible]Redis[illegible]src[illegible] make install[illegible]/usr/local/bin[illegible]

[illegible]Redis[illegible] make test[illegible]Redis[illegible]Redis[illegible]

[illegible] [illegible]Redis[illegible]Redis[illegible] Redis [illegible] Redis [illegible]Redis [illegible] http://redis.io/topics/problems [illegible]

2.1.2 [illegible]OS X[illegible]

OS X [illegible]Homebrew [illegible]MacPorts [illegible]Redis [illegible]Redis[illegible]POSIX[illegible]Homwbrew[illegible]Redis[illegible]

1[illegible]Homebrew

[illegible] ruby -e "$(curl -fsSkL raw.github.com/mxcl/homebrew/go)"[illegible]Homebrew[illegible]

[illegible] Homebrew[illegible] brew update [illegible] Homebrew[illegible]Redis[illegible]

2[illegible]Homebrew[illegible]Redis

[illegible] brew install [illegible] brew install redis[illegible]Redis[illegible]

```
$ brew install redis
```

```
==> Downloading https://downloads.sf.net/project/machomebrew/Bottles/redis-3.0.0.yosemite.bottle.tar.gz
########################################################################## 100.0%
==> Pouring redis-3.0.0.yosemite.bottle.tar.gz
==> Caveats
To have launchd start redis at login:
  ln -sfv /usr/local/opt/redis/*.plist ~/Library/LaunchAgents
Then to load redis now:
  launchctl load ~/Library/LaunchAgents/homebrew.mxcl.redis.plist
Or, if you don't want/need launchctl, you can just run:
  redis-server /usr/local/etc/redis.conf
==> Summary
  /usr/local/Cellar/redis/3.0.0: 10 files, 1.4M
```

OS X □□□Tiger □□□□□□□launchd □□□□□□□□□□□□□□Redis □□□□□□□□□□□□□□□□□launchd□

```
ln -sfv /usr/local/opt/redis/*.plist ~/Library/LaunchAgents
launchctl load ~/Library/LaunchAgents/homebrew.mxcl.redis.plist
```

□□launchd□□□Redis□□□□□/usr/local/etc/redis.conf□□□□□□□□□□□□□□2.4□□□□□

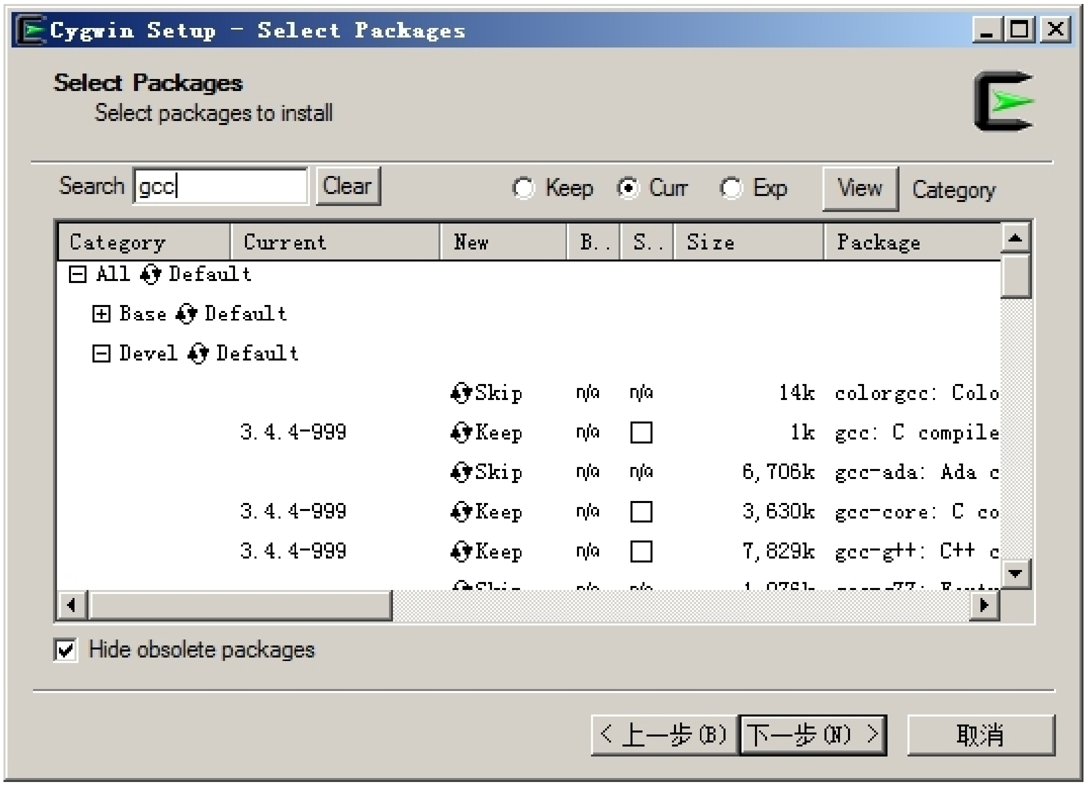
2.1.3 □Windows□□□

Redis□□□□□Windows□2011□□□[1]□Redis□□□□□□□□□□Redis□□□Windows□□□□□□□□Salvatore Sanfilippo□□□□□□□□□□□□□□Linux□□□□□□□□□□□□Redis□□Windows□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□ Windows □□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□Windows□□□Redis□□[2]□□□□□□□□□□□□□□□□□□□Windows□□Redis□□□2.8□

□□□□□ Windows □□□□□ Redis □□□□ Cygwin □□□□□□□□VirtualBox□□□□□Cygwin□□□Windows□□□Linux□□□□□Cygwin□□□□□ Linux API □□□□□□□□ Linux □□□□□□□□□□□□ Windows □□□□Cygwin□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Cygwin□□□□□□Windows□□□□□□□□□□□□□□Redis□

1□□□Cygwin

□Cygwin□□□□□http://cygwin.com□□□setup.exe□□□setup.exe□□Cygwin□□□□□□□Cygwin□□□□□□□□□□setup.exe□□□“Next”□□□□□□□□□□□□□□□□□□2-1□□□



Select Packages

Select packages to install

Search gcc Clear ○ Keep ● Curr ○ Exp View Category

Category	Current	New	B..	S..	Size	Package
⊟ All Default						
⊞ Base Default						
⊟ Devel Default						
		Skip	n/a	n/a	14k	colorgcc: Colo
	3.4.4-999	Keep	n/a	☐	1k	gcc: C compile
		Skip	n/a	n/a	6,706k	gcc-ada: Ada c
	3.4.4-999	Keep	n/a	☐	3,630k	gcc-core: C co
	3.4.4-999	Keep	n/a	☐	7,829k	gcc-g++: C++ c

☑ Hide obsolete packages

□2-1 Cygwin □□□□□

□□□□Redis□□□□□□□gcc□make□□□□□□□“Devel”□□□□□□□“New”□□□□□□“Skip”□□□□□□□□□□“Skip”□□□□□□□□□□□□□□Cygwin□□□□□□□□□□□□2-1□□□gcc□□□□□“Keep”□□setup.exe□□□□□□□□□□□□

□□□□□□□□□□□□□□wget□□□□□Redis□□□□□□□□□□□□□□Windows□□□□□□□□□□Cygwin□□□□□□□□□□□□□□vim□□□□□Redis□□□□□□□□□Cygwin□□□□□□□

□□□□“Next”□□□□□□□□□□□□□□□□□□□□

□□□□□□□Cygwin Terminal □□□□□□Cygwin □□□Cygwin □□Windows□□□□□□□Cygwin□□□□□□□□□□□□□□□□Cygwin□□□□□□□□□□Windows□□□□□C:\cygwin□

2□□□Redis□□□

□□□□□Redis□□□□2.1.1□□□□□□□□□□□make□□□□□□□Redis□□□□□□□□□□Cygwin□□□□□□

□□□□src□□□□redis.h□□□□□□□□□

```
#ifdef CYGWIN
#ifndef SA ONSTACK
#define SA ONSTACK 0x08000000
#endif
#endif
```

□□□□src□□□□object.c□□□□□□□□□

```
#define strtold(a,b) ((long double)strtod((a),(b)))
```

3□□□Redis

□2.1.1□□□□□□make□□□□□□□□□

□□ Cygwin □□□□□□□□Linux □□□□□Cygwin □fork □□□□□□□□□□□Redis□□□□□□□□Cygwin□□□□Cygwin□□□□□□□□Redis□□□Redis□□□□□□Linux□OS X□□□□□□□□□□□Linux□

2.2 □□□□□Redis

□□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□Redis□□□□

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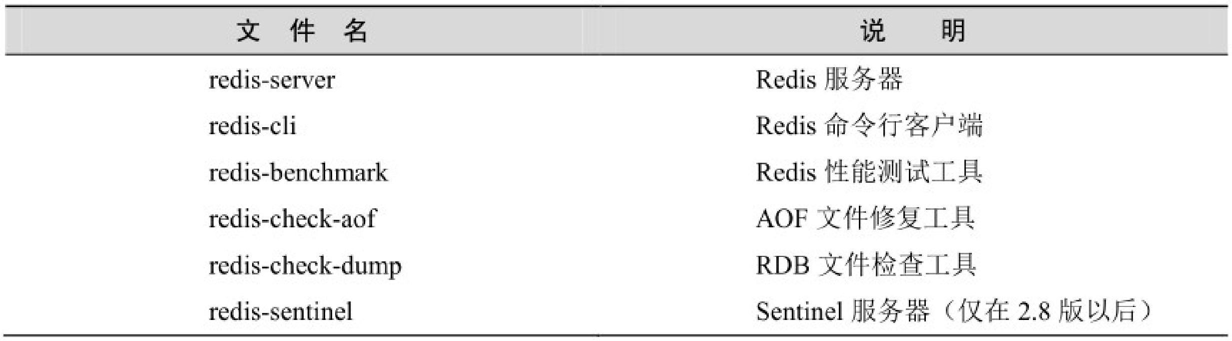
□2-1 Redis□□□□□□□



文　件　名	说　　明
redis-server	Redis 服务器
redis-cli	Redis 命令行客户端
redis-benchmark	Redis 性能测试工具
redis-check-aof	AOF 文件修复工具
redis-check-dump	RDB 文件检查工具
redis-sentinel	Sentinel 服务器（仅在 2.8 版以后）

□□□□□□□□□□□□redis-server□redis-cli□□□redis-server□Redis□□□□□□□Redis□□□redis-server□□redis-cli□Redis□□□Redis□□□□□□□□□□Redis□□□□□□2.3□□□□□□□□

2.2.1 □□Redis

□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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□□□□redis-server□□□□Redis□□□□□□

```
$ redis-server
[5101] 14 Dec 20:58:59.944 # Warning: no config file specified, using the default config. In order to specify a config file use redis-server /path/to/redis.conf
[5101] 14 Dec 20:58:59.948 * Max number of open files set to 10032
…
[5101] 14 Dec 20:58:59.949 # Server started, Redis version 2.6.9
[5101] 14 Dec 20:58:59.949 * The server is now ready to accept connections on port 6379
```

Redis□□□□□□□□□□6379□□[3]□□□--port□□□□□□□□□□□□□□

```
$ redis-server --port 6380
```

2□□□□□□□□□□Redis

□Linux□□□□□□□□□□□□□□Redis□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□Ubuntu□Debian□□□□□□□□□□□Redis□□□□□□utils□□□□□□□□□redis_init_script□□□□□□□□□□□□□□

```
#!/bin/sh
#
# Simple Redis init.d script conceived to work on Linux systems
# as it does use of the /proc filesystem.
REDISPORT=6379
EXEC=/usr/local/bin/redis-server
CLIEXEC=/usr/local/bin/redis-cli
PIDFILE=/var/run/redis_${REDISPORT}.pid
CONF="/etc/redis/${REDISPORT}.conf"
case "$1" in
  start)
    if [ -f $PIDFILE ]
    then
      echo "$PIDFILE exists, process is already running or crashed"
    else
      echo "Starting Redis server..."
      $EXEC $CONF
    fi
    ;;
  stop)
    if [ ! -f $PIDFILE ]
```

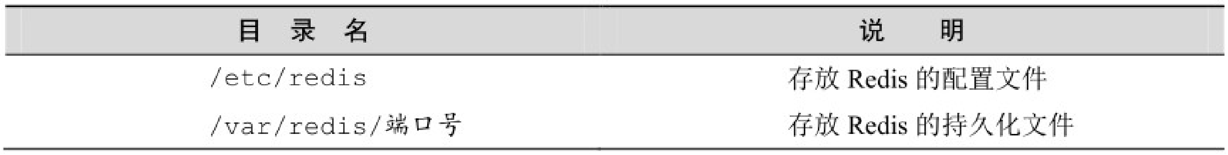
```
        then
            echo "$PIDFILE does not exist, process is not running"
        else
            PID=$(cat $PIDFILE)
            echo "Stopping ..."
            $CLIEXEC -p $REDISPORT shutdown
            while [ -x /proc/${PID} ]
            do
                echo "Waiting for Redis to shutdown ..."
                sleep 1
            done
            echo "Redis stopped"
        fi
        ;;
    *)
        echo "Please use start or stop as first argument"
        ;;
esac
```

[illegible]Redis[illegible]

[illegible]1[illegible]/etc/init.d [illegible] redis_[illegible]Redis[illegible]Redis[illegible]6[illegible]REDISPORT[illegible]

[illegible]2[illegible]2-2[illegible]

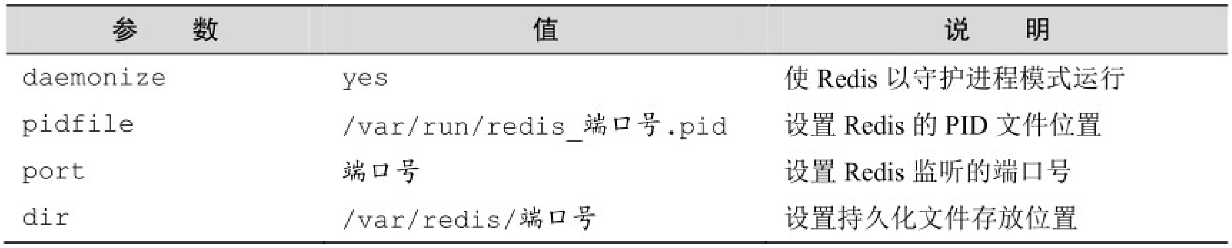
[illegible]2-2 [illegible]



目　录　名	说　　明
/etc/redis	存放 Redis 的配置文件
/var/redis/端口号	存放 Redis 的持久化文件

□3□□□□□□□□□□□□□□□□□□□ 2.4 □□□□□□□/etc/redis □□□□□□□□□□□□“6379.conf”□□□□□□□2-3□□□□□□□□□□□□□

□2-3 □□□□□□□□□□



参　　数	值	说　　明
daemonize	yes	使 Redis 以守护进程模式运行
pidfile	/var/run/redis_端口号.pid	设置 Redis 的 PID 文件位置
port	端口号	设置 Redis 监听的端口号
dir	/var/redis/端口号	设置持久化文件存放位置

□□□□□□□/etc/init.d/redis_□□□start□□□Redis□□□□□□□□□□□□□□Redis□□□□□□□□

$ sudo update-rc.d redis_□□□ defaults

2.2.2 □□Redis

□□□ Redis □□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□□□□□□□Redis□□□□□□□Redis□□SHUTDOWN□□□□□□□

$ redis-cli SHUTDOWN

□Redis□□SHUTDOWN□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

Redis□□□□□□ SIGTERM□□□□□□□ kill Redis □□□ PID□□□□□□□Redis□□□□□□SHUTDOWN□□□□□

2.3 Redis□□□□□□

[illegible]redis-cli[illegible]redis-cli[illegible]Redis Command Line Interface[illegible]Redis[illegible]Redis[illegible]Redis[illegible]Redis[illegible]

[illegible]redis-cli[illegible]Redis[illegible]Redis[illegible]

2.3.1 [illegible]

[illegible]redis-cli[illegible]Redis[illegible]redis-cli[illegible]2.2.2[illegible] redis-cli SHUTDOWN[illegible]redis-cli[illegible]127.0.0.1[illegible]6379[illegible]Redis[illegible]-h[illegible]-p[illegible]

```
$ redis-cli -h 127.0.0.1 -p 6379
```

Redis[illegible]PING[illegible]Redis[illegible]PONG[illegible]

```
$ redis-cli PING
PONG
```

[illegible] redis-cli[illegible]

```
$ redis-cli
redis 127.0.0.1:6379> PING
PONG
redis 127.0.0.1:6379> ECHO hi
"hi"
```

[illegible]redis>[illegible] redis 127.0.0.1:6379>[illegible]

2.3.2 [illegible]

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 1.2.4 □□□HGET□□□□□□□□□□□□□□□□□title□□□□□□□□□□□□5□□□□□□□□□□redis-cli□□□□□□□□□□□□□□□□

1□□□□□

□□□□□status reply□□□□□□□□□□□□□□ Redis □□ SET □□□□□□□□□□□Redis□□□□□OK□□□□□□□□□□□□□□□PING□□□□□PONG□□□□□□□□□□□□□□□□□□□□□□

```
redis> PING
PONG
```

2□□□□□

□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□error reply□□□□□□□(error)□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> ERRORCOMMEND
(error) ERR unknown command 'ERRORCOMMEND'
```

□2.6□□□□□□□□□□□“ERR”□□□□□2.8□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> LPUSH key 1
(integer) 1
redis> GET key
(error) WRONGTYPE Operation against a key holding the wrong kind of value
```

□□□□□□□□□“WRONGTYPE”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

3□□□□□

Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□INCR□□DBSIZE□□□□□□□□□integer reply□□(integer)□□□□□□□□□□□□□□

```
redis> INCR foo
(integer) 1
```

4□□□□□□

□□□□□□bulk reply□□

```
redis> GET foo
"1"
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□(nil)□□□

```
redis> GET noexists
(nil)
```

5□□□□□□□□

□□□□□□□□multi-bulk reply□□□

```
redis> KEYS *
1) "bar"
2) "foo"
```

□□ KEYS□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□empty list or set□□3.1 □□□□□□KEYS□□□□□□□□□□□□□□□□□□□□□□□□

2.4 □□

2.2.1 □□□□□□ redis-server □□□□□ port □□□ Redis □□□□□□□□□Redis□□□ Redis □□□redis-server□□□

```
$ redis-server /path/to/redis.conf
```

[illegible]

```
$ redis-server /path/to/redis.conf --loglevel warning
```

Redis[illegible]redis.conf[illegible]

[illegible]Redis [illegible] CONFIG SET [illegible]Redis [illegible]Redis[illegible]

```
redis> CONFIG SET loglevel warning
OK
```

[illegible] CONFIG SET[illegible]B [illegible] CONFIG GET [illegible]Redis [illegible]

```
redis> CONFIG GET loglevel
1) "loglevel"
2) "warning"
```

[illegible]

2.5 [illegible]

[illegible]1[illegible]Redis[illegible]Redis[illegible]

[illegible]0[illegible]Redis[illegible]16[illegible]databases[illegible]Redis[illegible]0[illegible]SELECT[illegible]1[illegible]

```
redis> SELECT 1
OK
redis [1]> GET foo
```

(nil)

[illegible] Redis [illegible] Redis [illegible] FLUSHALL [illegible] Redis [illegible] 0 [illegible] 1 [illegible] 0 [illegible] A [illegible] 1 [illegible] B [illegible] Redis [illegible] Redis [illegible] Redis [illegible] 1MB [illegible] Redis [illegible]

[illegible]

[1]. [illegible] Microsoft Open Technologies Inc. [illegible]

[2]. https://github.com/MSOpenTech/Redis

[3]. 6379 [illegible] MERZ [illegible] MERZ [illegible]

[illegible]3[illegible] [illegible]

[illegible]Redis[illegible]Redis[illegible]Redis[illegible]5[illegible] Redis [illegible] redis-cli [illegible]Redis[illegible]

[illegible] Redis [illegible] Redis [illegible]Redis[illegible]Redis[illegible] Redis [illegible]——[illegible]

3.2[illegible]3.6[illegible]5[illegible]Redis[illegible]5[illegible]4[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

3.1 [illegible]

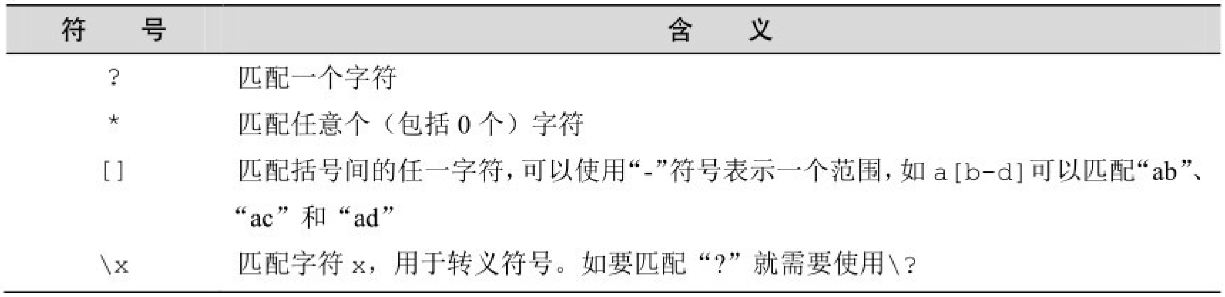
[illegible] Redis [illegible]redis-cli[illegible]

1[illegible]

KEYS pattern

pattern[illegible]glob[illegible]3-1[illegible]

[illegible]3-1 glob [illegible]



符　号	含　义
?	匹配一个字符
*	匹配任意个（包括 0 个）字符
[]	匹配括号间的任一字符，可以使用“-”符号表示一个范围，如 a[b-d] 可以匹配“ab”、“ac”和“ad”
\x	匹配字符 x，用于转义符号。如要匹配“?”就需要使用\?

□□Redis□□□□□□□□□□□2□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□foo□□□□□□□KEYS□□□□□□□□□Redis□□□□□□SET□□□□□3.2□□□□□□□□□□bar□□□

```
redis> SET bar 1
OK
```

□□□□ KEYS *□□□□Redis□□□□□□□□□□□□□□□□□□□bar□□□□KEYS ba*□□ KEYS bar □□□□□□□□□□□□□□

```
redis> KEYS *
1) "bar"
```

□□ KEYS□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□ Redis□□□□□□□□□□□□□□□□□□□□□□□□Redis □□□

2□□□□□□□□□□

EXISTS key

□□□□□□□□□□□□1□□□□□0□□□□

```
redis> EXISTS bar
(integer) 1
redis> EXISTS noexists
(integer) 0
```

3□□□□

DEL key [key …]

□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> DEL bar
(integer) 1
redis> DEL bar
(integer) 0
```

[illegible]DEL[illegible]bar[illegible]0[illegible]

[illegible] DEL [illegible]Linux[illegible] xargs[illegible]“user:”[illegible]redis-cli KEYS "user:*" | xargs redis-cli DEL[illegible] DEL [illegible] redis-cli DEL `redis-cli KEYS "user:*"`[illegible]

4[illegible]

TYPE key

TYPE[illegible]string[illegible]hash[illegible]list[illegible]set[illegible]zset[illegible]

```
redis> SET foo 1
OK
redis> TYPE foo
string
redis> LPUSH bar 1
(integer) 1
redis> TYPE bar
list
```

LPUSH[illegible] 3.4[illegible]

3.2 [illegible]

[illegible]“Powered by WordPress”[1] [illegible] MySQL[illegible]Node Party[illegible] Redis [illegible] Redis [illegible]Redis[illegible]

[illegible]

[illegible] Redis[illegible]Redis[illegible]

[illegible]

[illegible] Redis[illegible] Redis[illegible] Redis[illegible] Redis[illegible]Redis[illegible] Redis[illegible] Redis[illegible]Redis[illegible]Redis[illegible] ——[illegible]

3.2.1 [illegible]

[illegible] Redis [illegible]JSON [illegible]512 MB[2] [illegible]

[illegible]4[illegible]

3.2.2 [illegible]

1[illegible]

```
SET key value
GET key
```

SET[illegible]GET[illegible]Redis[illegible]key = "hello"[illegible]Redis[illegible]

```
redis> SET key hello
OK
```

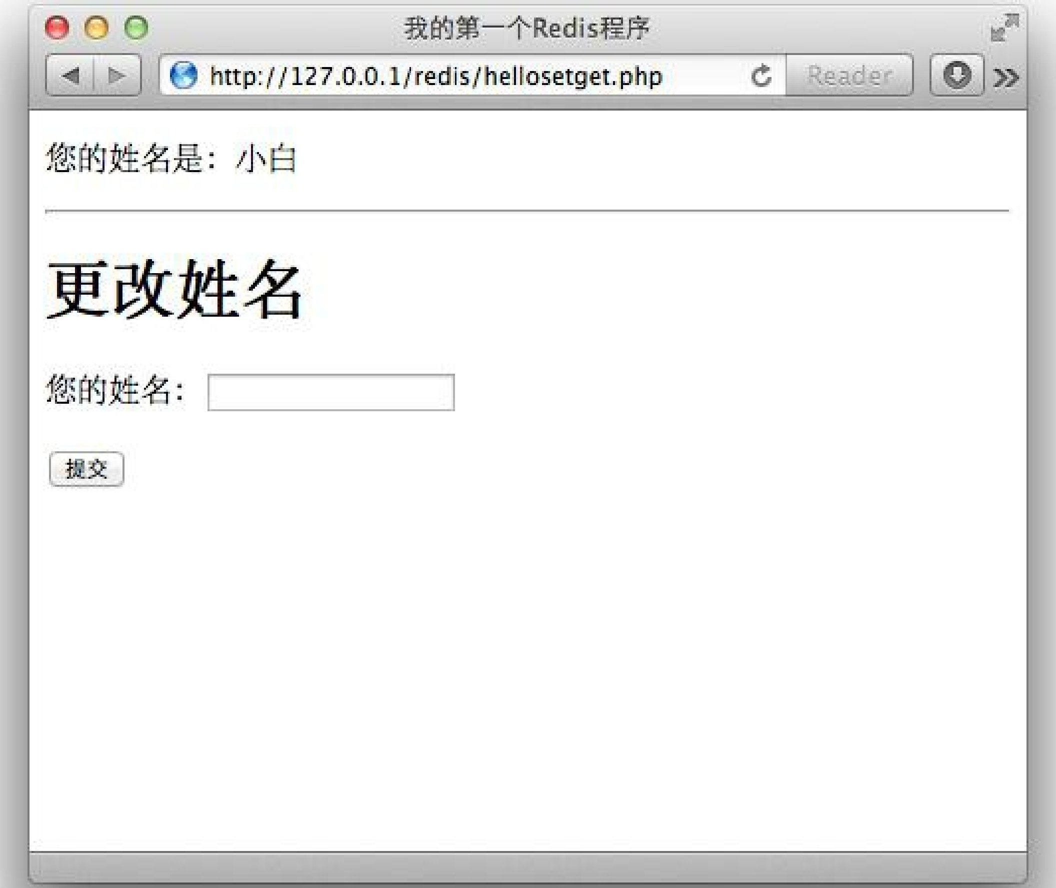
[illegible]

```
redis> GET key
"hello"
```

[illegible]

[illegible]redis-cli[illegible]5[illegible]PHP[illegible]Python[illegible]Ruby[illegible]Node.js[illegible]Redis[illegible]

[illegible] Redis [illegible] PHP [illegible] SET/GET[illegible] GET[illegible]Redis[illegible]3-1[illegible] 3-2 [illegible]“[illegible]”[illegible] SET[illegible]Redis[illegible]

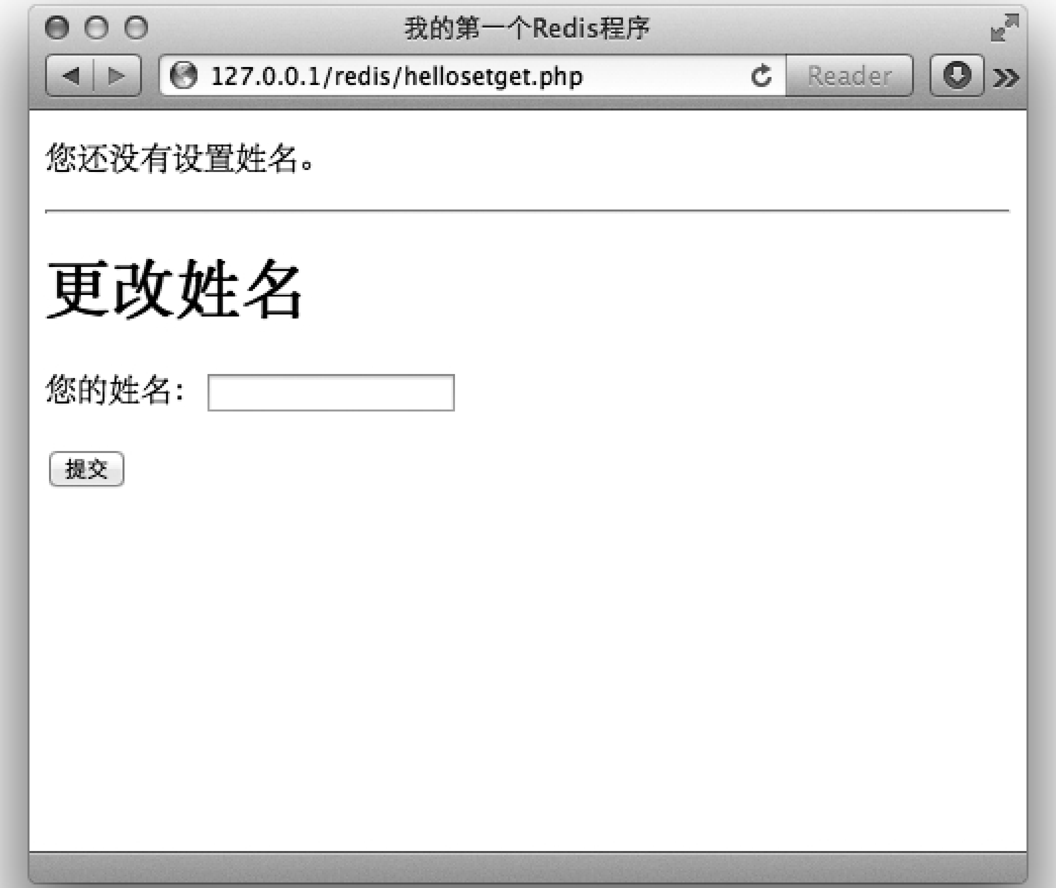


您的姓名是：小白

更改姓名

您的姓名：

□3-1 □□□□□□□□□



您还没有设置姓名。

更改姓名

您的姓名：

□3-2 □□□□□□□□□□□

□□□□□

```
<?php
//□□ Predis □□□□□□□□
require './predis/autoload.php';
//□□ Redis
$redis= new Predis\Client(array(
   'host'   => '127.0.0.1',
   'port'   => 6379
));
//□□□□□□□□□□ SET □□□□□□□□ Redis □
if ($_GET['name']) {
    $redis->set('name', $_GET['name']);
}
//□□ GET □□□ Redis □□□□□
$name = $redis->get('name');
?><!DOCTYPE html>
<html>
    <head>
        <meta charset="utf-8" />
        <title>□□□□□Redis□□</title>
    </head>
    <body>
        <?php if ($name): ?>
            <p>□□□□□□<?php echo $name; ?></p>
        <?php else: ?>
            <p>□□□□□□□□□</p>
        <?php endif; ?>
        <hr />
        <h1>□□□□</h1>
        <form>
            <p>
                <label for="name">□□□□□</label>
                <input type="text" name="name" id="name" />
            </p>
            <p>
            <button type="submit">□□</button>
          </p>
        </form>
    </body>
</html>
```

□□□□□□□□□□PHP□Redis□□□□Predis□Redis□□□5.1□□□□□□Predis□□□□□□□□□□□□5.1□□□Predis□□□□□□□□□□□□□□□

Redis□□□□□□□□□□Predis□□□□□□□□□□□□□□□□□INCR□□□□□□□□$redis->incr(□□)□

2□□□□□

INCR key

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□ INCR□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> INCR num
(integer) 1
redis> INCR num
(integer) 2
```

□□□□□□□□□□□□□□□□0□□□□□□□□□□□□□1□□□□□□□□□Redis□□□□□□

```
redis> SET foo lorem
OK
redis> INCR foo
(error) ERR value is not an integer or out of range
```

□□□□□□□□□□□GET□SET□□□□□□□□incr□□□□□□□□□

```
def incr($key)
  $value = GET $key
  if not $value
  $value = 0
$value = $value + 1
SET $key, $value
return $value
```

□□ Redis □□Redis□□□□□□□□□□□□race condition□[3]□□□□□□□□□A □B □□□□□□□□□□□ incr □□“5”□□□□□□□□□□□□□“6”□□□ SET □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□“6”□□□□□□□“7”□□□ INCR□□□□□Redis□□□□□□□□□atomic operation□[4]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□4.1□□□□□□□6□□□□□□□□□□□□□□□□

3.2.3 □□

1□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□post:□□ID:page.view□□□□□□□□□□□□□□□□□□□□□□□INCR□□□□□□□□□□□

□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□“□□□□:□□ID:□□□□”□□□□□□□□□□□user:1:friends□□□ID□1□□□□□□□□□□□□□□□□□□□□“.”□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□ redis-cli □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ u:1:f□□□□□□□□user:1:friends□□

2□□□□□ID

□□□□□□□□□□□□□□□ ID □□□□□□□□□□□□□□□□□□□□AUTO_INCREMENT□□□□□□□□□□□□□□□□□□□□□□□ ID □□□□□□

Redis[illegible]([illegible]):count[5][illegible]users:count[illegible]INCR[illegible]INCR[illegible]1[illegible] INCR[illegible]ID[illegible]

3[illegible]

[illegible]PHP[illegible] serialize[illegible]JavaScript[illegible]JSON.stringify[illegible]MessagePack[6][illegible]

[illegible]Redis[illegible]

```
# [illegible] ID
$postID = INCR posts:count
# [illegible]
$serializedPost = serialize($title, $content, $author, $time)
# [illegible]
SET post:$postID:data, $serializedPost
```

[illegible]ID[illegible]42[illegible]

```
# [illegible] Redis [illegible]
$serializedPost = GET post:42:data
# [illegible]
$title, $content, $author, $time = unserialize($serializedPost)
# [illegible]
$count = INCR post:42:page.view
```

[illegible]3.3.3[illegible]

3.2.4 [illegible]

1[illegible]

```
INCRBY key increment
```

INCRBY[illegible]INCR[illegible]increment[illegible]

```
redis> INCRBY bar 2
(integer) 2
redis> INCRBY bar 3
(integer) 5
```

2[illegible]

```
DECR key
DECRBY key decrement
```

DECR[illegible]INCR[illegible]

```
redis> DECR bar
(integer) 4
```

[illegible] DECRBY [illegible]DECRBY key 5 [illegible] INCRBY key –5[illegible]

3[illegible]

```
INCRBYFLOAT key increment
```

INCRBYFLOAT[illegible]INCRBY[illegible]

```
redis> INCRBYFLOAT bar 2.7
"6.7"
redis> INCRBYFLOAT bar 5E+4
```

```
"50006.69999999999999929"
```

4□□□□□□□

APPEND key value

APPEND□□□□□□□□□□□value□□□□□□□□□□□□□□□□value□□□□□SET key value□□□□□□□□□□□□□□□□□□

```
redis> SET key hello
OK
redis> APPEND key " world!"
(integer) 12
```

□□ key □□□"hello world!"□APPEND □□□□□□□□□□□□□□□□□□□□□□□□□□redis-cli□□□□□□□□□□□□□

5□□□□□□□□

STRLEN key

STRLEN□□□□□□□□□□□□□□□□□□□0□□□□

```
redis> STRLEN key
(integer) 12
redis> SET key □□
OK
redis> STRLEN key
(integer) 6
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□UTF-8□□□□□□□□“□”□“□”□□□□UTF-8□□□□□□□3□□□□□□□□□6□

6□□□□□/□□□□□□

MGET key [key …]

MSET key value [key value …]

MGET/MSET □GET/SET □□□□□MGET/MSET □□□□□□/□□□□□□□□□□□□

```
redis> MSET key1 v1 key2 v2 key3 v3
OK
redis> GET key2
"v2"
redis> MGET key1 key3
1) "v1"
2) "v3"
```

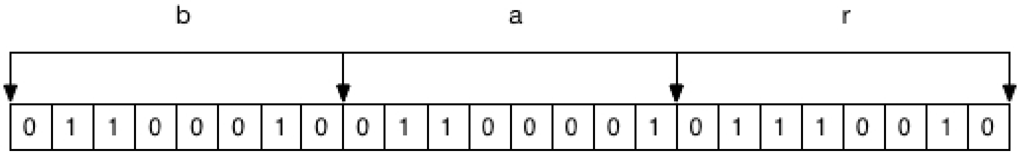
7[illegible]

```
GETBIT key offset
SETBIT key offset value
BITCOUNT key [start] [end]
BITOP operation destkey key [key …]
```

[illegible]8[illegible]Redis[illegible]4[illegible]foo[illegible]bar[illegible]

```
redis> SET foo bar
OK
```

bar[illegible]3[illegible]“b”“a”[illegible]“r”[illegible]ASCII[illegible]98[illegible]97[illegible]114[illegible]1100010[illegible]1100001[illegible]1110010[illegible]foo[illegible]3-3[illegible]



[illegible]3-3 bar [illegible]

GETBIT[illegible]0[illegible]1[illegible]0[illegible]

```
redis> GETBIT foo 0
(integer) 0
redis> GETBIT foo 6
(integer) 1
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□0□

```
redis> GETBIT foo 100000
(integer) 0
```

SETBIT □□foo□□□□□aar□□□□□□□□□foo□□□□□□□□□□6□□□0□□7□□□1□

```
redis> SETBIT foo 6 0
(integer) 1
redis> SETBIT foo 7 1
(integer) 0
redis> GET foo
"aar"
```

□□□□□□□□□□□□□□□□□□□□□□SETBIT□□□□□□□□□□□□□□□□0□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□0□

```
redis> SETBIT nofoo 10 1
(integer) 0
redis> GETBIT nofoo 5
(integer) 0
```

BITCOUNT□□□□□□□□□□□□□□□1□□□□□□□□□□□

```
redis> BITCOUNT foo
(integer) 10
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□"aa"□□

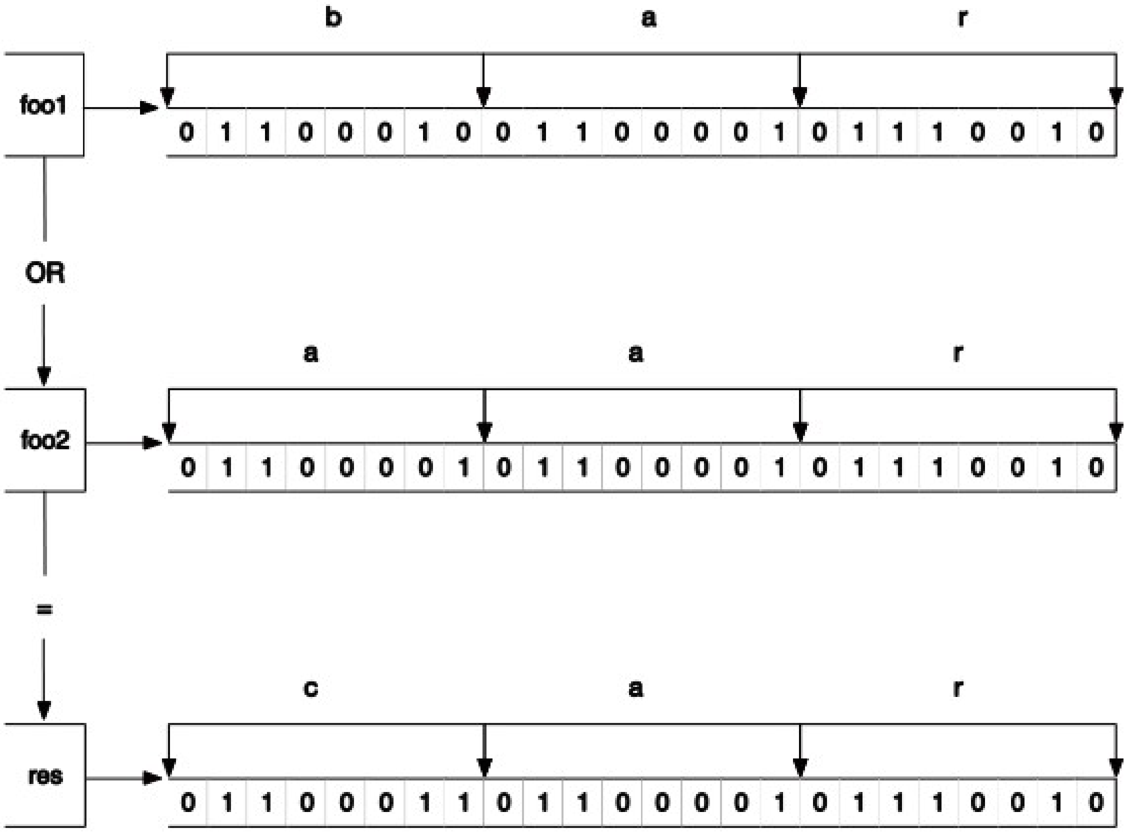
```
redis> BITCOUNT foo 0 1
(integer) 6
```

BITOP□□□□□□□□□□□□□□□□□□□□□□□□□□destkey□□□□□□□□BITOP□□□□□□□□□□AND□OR□XOR□NOT□□□□□□□bar□aar□□OR□□□

```
redis> SET foo1 bar
```

```
OK
redis> SET foo2 aar
OK
redis> BITOP OR res foo1 foo2
(integer) 3
redis> GET res
"car"
```

□□□□□□3-4□□□



□3-4 OR □□□□□□

Redis 2.8.7□□□ BITPOS□□□□□□□□□□□□□□□□□0□□1□□□□□□□“bar”□□□□□□□□□□□□□□□□□□□□□□□□1□□□□□□□□□□□

```
redis> SET foo bar
OK
```

```
redis> BITPOS foo 1
(integer) 1
```

[illegible]3-3[illegible]BITPOS[illegible]“bar”[illegible]1[illegible]1[illegible]BITPOS[illegible]0[illegible]BITPOS [illegible]0[illegible]“a”[illegible]“r”[illegible]1[illegible]

```
redis> BITPOS foo 1 1 2
(integer) 9
```

[illegible]1[illegible]0[illegible] Redis [illegible]0[illegible]

[illegible]ID[illegible]ID[illegible]1[illegible]0[illegible]100[illegible]100 KB[illegible]GETBIT[illegible]SETBIT[illegible]O(1)[illegible]

[illegible] [illegible] SETBIT [illegible]Redis[illegible] 0[illegible]2014[illegible]MacBook Pro [illegible]232-1[illegible] 500 MB [illegible] 1 [illegible]ID[illegible]100000001[illegible]10[illegible]MB[illegible]ID[illegible]100000000[illegible]

3.3 [illegible]

[illegible]Bootstrap[illegible][7][illegible]HTML[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

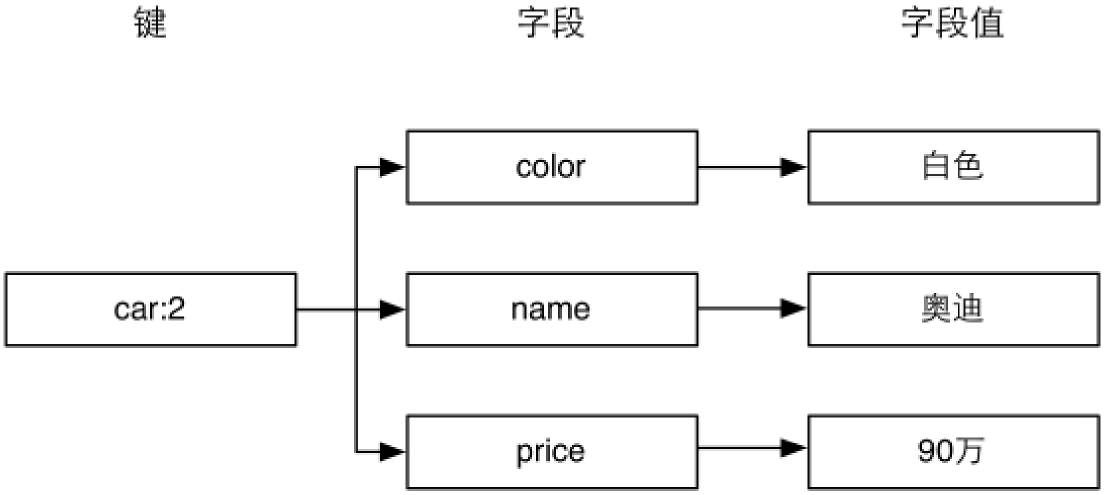
[illegible] Redis [illegible]

3.3.1 [illegible]

[illegible] Redis [illegible]hash[illegible]field[illegible]232−1[illegible]

[illegible] [illegible]Redis [illegible]

[illegible] ID [illegible]ID[illegible]2[illegible]color[illegible]name[illegible]price[illegible]3[illegible]3-5[illegible]



□3-5 □□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□3-2□□□

□3-2 □□□□□□□□□□□□□□□

ID	color	name	price
1	黑色	宝马	100 万
2	白色	奥迪	90 万
3	蓝色	宾利	600 万

□□□ ID □ 1 □□□□□□□□□□□□□□□□□□□□□□□□3-3□□□□□□

□3-3 □□□□□□□□□□□□“□□”

ID	color	name	price	date
1	黑色	宝马	100 万	2012 年 12 月 21 日
2	白色	奥迪	90 万	
3	蓝色	宾利	600 万	

□□ID□2□3□□□□□□□date□□ORM[8]□□

□ Redis □□□□□□□□□□□□□□□□□□□□ 3-5 □□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible]

3.3.2 [illegible]

1[illegible]

```
HSET key field value
HGET key field
HMSET key field value [field value …]
HMGET key field [field …]
HGETALL key
```

HSET[illegible]HGET[illegible]

```
redis> HSET car price 500
(integer) 1
redis> HSET car name BMW
(integer) 1
redis> HGET car name
"BMW"
```

HSET [illegible]update[illegible]insert[illegible]HSET[illegible]1[illegible]HSET[illegible]0[illegible]HSET[illegible]

[illegible] [illegible]Redis[illegible] HSET[illegible]SET[illegible]"ERR Operation against a key holding the wrong kind of value"[9] [illegible]

[illegible]HMSET[illegible]

```
HSET key field1 value1
HSET key field2 value2
```

□□□HMSET□□□□□

```
HMSET key field1 value1 field2 value2
```

□□□□HMGET□□□□□□□□□□□□□□□

```
redis> HMGET car price name
1) "500"
2) "BMW"
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3.3.1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□HGETALL□□□□□

```
redis> HGETALL car
1) "price"
2) "500"
3) "name"
4) "BMW"
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□ HGETALL □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Node.js□□

```
redis.hgetall("car", function (error, car) {
   //hgetall □□□□□□□□□□□□ JavaScript□□□
   console.log(car.price);
   console.log(car.name);
});
```

2□□□□□□□□□

```
HEXISTS key field
```

HEXISTS□□□□□□□□□□□□□□□□□□□□□□1□□□□□0□□□□□□□□□□□0□□

```
redis> HEXISTS car model
(integer) 0
```

```
redis> HSET car model C200
(integer) 1
redis> HEXISTS car model
(integer) 1
```

3□□□□□□□□□□

HSETNX key field value

HSETNX[10]□□□HSET□□□□□□□□□□□□□□□□□□HSETNX□□□□□□□□□□□□□□□□□□□□□□□□□

```
def hsetnx($key, $field, $value)
  $isExists = HEXISTS $key, $field
  if $isExists is 0
    HSET $key, $field, $value
    return 1
  else
    return 0
```

□□□HSETNX□□□□□□□□□□□□□□□□□

4□□□□□

HINCRBY key field increment

□□□□□□□□□□□□□□□□□□□□□INCRBY□HINCRBY□□□□□□□□□□□□□□□□□□□□□□□□□□□ HINCR □□□□□□□□□ HINCRBY key field 1□□□□

HINCRBY□□□□□□□□

```
redis> HINCRBY person score 60
(integer) 60
```

□□person□□□□□HINCRBY□□□□□□□□□□□□score□□□□□□□□□□□“0”□□□□□□□□□□□□□□□□

5□□□□□

HDEL key field [field …]

HDEL[illegible]

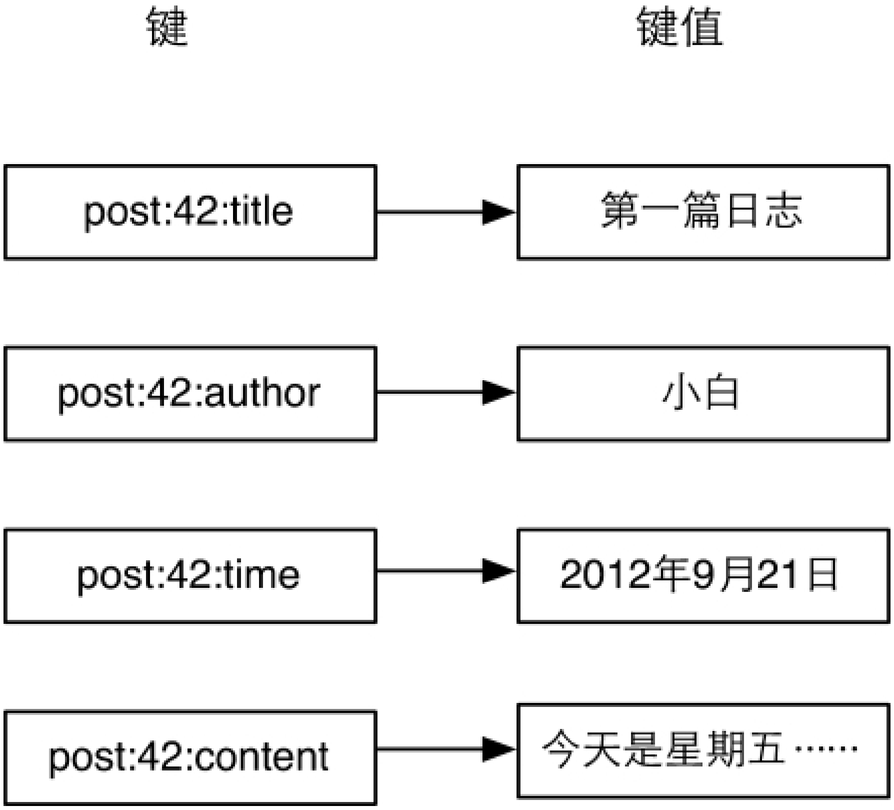
```
redis> HDEL car price
(integer) 1
redis> HDEL car price
(integer) 0
```

3.3.3 [illegible]

1[illegible]

3.2.3[illegible]

[illegible]3-6[illegible]



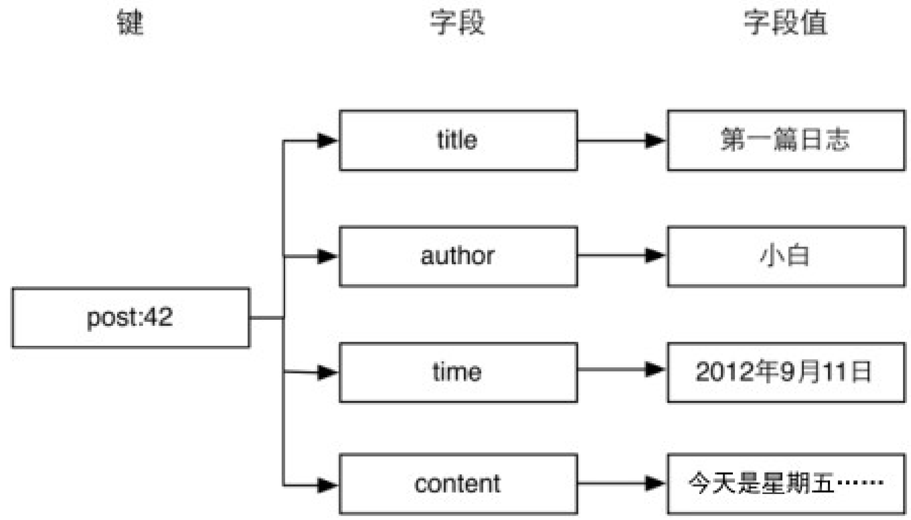
[illegible]3-6 [illegible]

□□3-7□□□

□□3-7□□□□□□□□□□□□□□□□□□3-6□□□□□□□□□□□□□□□□□□□□□□□□□□ HGETALL □□4.6□□□□□

2□□□□□□□□

□□□WordPress□□□□□□□□□□□□□□□□□□□□□□□□□slug□□□“This Is A Great Post!”□□□□□□□“this-is-a-great-post”□□ID□



□3-7 □□□□□□□□□□□□□□□

□□□□□□□□□□□□□□slug.to.id□□□□□□□□□ID□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ID□□□□□□□□HEXISTS□□□□□□□□□□□□□□□HGET□□□□□□□□□□□□□ID□□

□□□□□□□□□□□□□□□□

```
$postID = INCR posts:count
# □□□□□□□ slug □□□□□□□□□□□□
$isSlugAvailable = HSETNX slug.to.id, $slug, $postID
```

```
if $isSlugAvailable is 0
    # slug □□□□□□□□□□□□□□ slug,
    # □□□□□□□□□□□□□
    exit
HMSET post:$postID, title, $title, content, $content, slug, $slug,...
```

□□□□□□□HSETNX□□□□□□□□HEXISTS□HSET□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□slug.to.id□□□□□□ID□

```
$postID = HGET slug.to.id, $slug
if not $postID
    print □□□□□
    exit
$post = HGETALL post:$postID
print □□□□□$post.title
```

□□□□□□□□□□□□□□□□□□□□□□□□□ slug.to.id □□□□□□□□□□□ID□42□□□□□□□□newSlug□□□□□

```
# □□□□ slug □□□□□□□□□□□□
$isSlugAvailable = HSETNX slug.to.id, $newSlug, 42
if $isSlugAvailable is 0
    exit
# □□□□□□□
$oldSlug = HGET post:42, slug
# □□□□□□□
HSET post:42, slug, $newSlug
# □□□□□□□
HDEL slug.to.id, $oldSlug
```

3.3.4 □□□□

1□□□□□□□□□□□

HKEYS key

HVALS key

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□HKEYS□□□□□□□□

```
redis> HKEYS car
1) "name"
2) "model"
```

HVALS□□□HKEYS□□□□□□HVALS□□□□□□□□□□□□□□□□□

```
redis> HVALS car
1) "BMW"
2) "C200"
```

2□□□□□□□

HLEN key

□□□

```
redis> HLEN car
(integer) 2
```

3.4 □□□□

□□□

□□□□□□□□□□□□□□□□□□□

- □□ posts:count□□□□□□□□□□□ID□

- □□□□ ID □□□□□□□□□□□□□□□□□ ID □□□□□□□□□□□□□□10□□□□□□ID□□□□□□□□□n□□□□ID□□□□□□□□□ID - (n - 1) * 10"□"max(□□□□□ ID - n * 10 + 1, 1)"□
- □□□ID □□ HMGET□□□□□□□□□□

□□□□□□□□□

```
# □□□□ 10 □□□
$postsPerPage = 10
# □□□□□□□□□ ID
$lastPostID = GET posts:count
# $currentPage □□□□□□□□□□□□□$currentPage□□□ 1□□□□□
$start = $lastPostID - ($currentPage - 1) * $postsPerPage
$end = max($lastPostID - $currentPage * $postsPerPage + 1, 1)
# □□□□ ID □□□□
for $i = $start down to $end
    # □□□□□□□□□□□□□□□
    post = HMGET post:$i, title, author
    print $post[0] # □□□□
    print $post[1] # □□□□
```

□□□□□□□□□□□□□□□□□□□ ID □□□□□□□□□□□□□□□□EXISTS□□□□□□ID□□□10□□□□□□□□□□□□□□□□□□□□□ID□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□“□□□□□□”□□□□□□□□□□□□□□“□□□□KEYS□□□□□□□□□ KEYS□□□□□□□“post:”□□□□□□□□□□□□□□□□”

□□□□□□□“□□□□□□□KEYS□□□ Redis □□□□□□□□□”

3.4.1 □□

□□□□□list□□□

□□□□□□□□□□□□□□double linked list□□□□□□□□□□□□□□□□□□□□□□□O(1)□□10□□□□□□□□□□□□□20□□□□□□□□□□□□□□□10□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□ iPad mini □□□□□1000□□□486 □□□□□□□□□iPad mini□□□□□□□486 □□□□□□□□□□□□□□□□□□□□□□ 486 □□□

□□100□□□□□□□□□□□□□□□□□□□□□□□□□□□O(1)□□□

□□□□□□□Redis□□□□□□□□□□4.4□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□232−1□□□□

3.4.2 □□

1□□□□□□□□□□

```
LPUSH key value [value …]
RPUSH key value [value …]
```

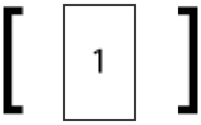
LPUSH□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> LPUSH numbers 1
(integer) 1
```

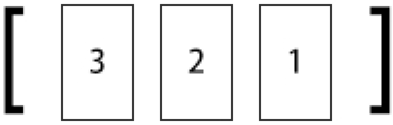
□□numbers□□□□□□□3-8□□□LPUSH□□□□□□□□□□□□□□□□□

```
redis> LPUSH numbers 2 3
(integer) 3
```

LPUSH□□□□□□□□□"2"□□□□□□"3"□□□□□numbers□□□□□□□3-9□□□



□3-8 □□□□1 □ numbers □□□□□

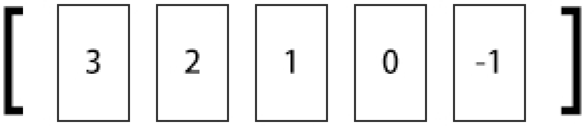


□3-9 □□□□2□3□ numbers □□□□□

□□□□□□□□□□□□□□RPUSH□□□□□□□LPUSH□□□□□

```
redis> RPUSH numbers 0 −1
(integer) 5
```

□□numbers□□□□□□□3-10□□□



□3-10 □□ RPUSH □□□□□□0□-1□ numbers □□□□□

2□□□□□□□□□□

```
LPOP key
RPOP key
```

□□□□□LPOP□□□□□□□□□□□□□□□□LPOP□□□ numbers□□□□□□□□□□□□□"3"□□

```
redis> LPOP numbers
"3"
```

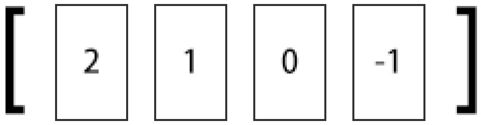
□□numbers□□□□□□□3-11□□□

□□□RPOP□□□□□□□□□□□□□□□□

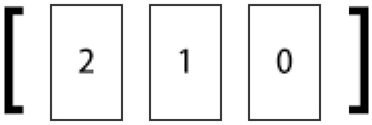
```
redis> RPOP numbers
"-1"
```

□□numbers□□□□□□□3-12□□□

□□□□□□□ 4 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ LPUSH□LPOP□RPUSH□RPOP□□□□□□□□□□□□□□LPUSH□RPOP□ RPUSH□LPOP□



□3-11 □□□□□□□□numbers□□□□□



□3-12 □□□□□□□□numbers□□□□□

3□□□□□□□□□□□

LLEN key

□□□□□□LLEN□□□0□

```
redis> LLEN numbers
(integer) 3
```

LLEN □□□□□□□SQL□□ SELECT COUNT(*) FROM table_name□□□ LLEN□□□□□□□O(1)□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□InnoDB□□□□□MySQL□□□□□□□□□□□□□□□□□□□□□

4□□□□□□□

LRANGE key start stop

LRANGE□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□LRANGE□□□□□□□□ start□ stop□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□0□

```
redis> LRANGE numbers 0 2
1) "2"
```

```
2) "1"
3) "0"
```

LRANGE□□□□□□□□□□□□□□LPOP□□□□□□□□□LRANGE□□□□□□□□□□□□□□□□□□slice□□□□□□LRANGE□□□□□□□□□□□□□□JavaScript□□

```
var numbers = [2, 1, 0];
console.log(numbers.slice(0, 2)); //□□□□□[2, 1]
```

LRANGE□□□□□□□□□□□□□□□□□□□□□"−1"□□□□□□□□□□"-2"□□□□□□□□□□□□□□□

```
redis> LRANGE numbers -2 -1
1) "1"
2) "0"
```

□□□LRANGE numbers 0 -1 □□□□□□□□□□□□□□□□□□□□□□□

1□□□start□□□□□□stop□□□□□□□□□□□□□□□

2□□□stop□□□□□□□□□□□□□□□□□□□□□□□

```
redis> LRANGE numbers 1 999
1) "1"
2) "0"
```

5□□□□□□□□□

LREM key count value

LREM□□□□□□□□count□□□value□□□□□□□□□□□□□□□□□□count□□□□□LREM□□□□□□□□□□□□

□1□□ count > 0□ LREM □□□□□□□□□□□□ count □□□ value□□□□

□2□□ count < 0□ LREM □□□□□□□□□□□□|count|□□□ value □□□□

□3□□ count = 0□ LREM□□□□□□□□□ value□□□□□□

```
redis> RPUSH numbers 2
(integer) 4
redis> LRANGE numbers 0 -1
1) "2"
2) "1"
3) "0"
4) "2"
# □□□□□□□□□□□□"2"□□□
redis> LREM numbers -1 2
(integer) 1
redis> LRANGE numbers 0 -1
1) "2"
2) "1"
3) "0"
```

3.4.3 □□

1□□□□□ID□□

□□□□□□□□□□□□□□□□□□□□□posts:list□□□□ID□□□□□□□□□□□□LPUSH□□□□□□□ID□□□□□□□□□□□□□□□□□□□□□□□□□□ID □□□□□□□□LREM posts:list 1 □□□□□□ ID

□□□□ ID□□□□□□□□ LRANGE□□□□□□□□□□□□□□□□□□□□

```
$postsPerPage = 10
$start = ($currentPage - 1) * $postsPerPage
$end = $currentPage * $postsPerPage - 1
$postsID = LRANGE posts:list, $start, $end
# □□□□□□□□□□□□ ID□□□□□□□□□□□□□□□□□
```

```
for each $id in $postsID
    $post = HGETALL post:$id
    print [illegible]$post.title
```

[illegible]LRANGE[illegible]

[illegible] MGET[illegible]ID[illegible]round-trip delay time[illegible][11] [illegible]

[illegible]ID[illegible]

[illegible]1[illegible]post:[illegible]ID[illegible]time[illegible]posts:list[illegible]

[illegible]2[illegible]

[illegible]3.6[illegible]ID[illegible]

2[illegible]

[illegible]

[illegible] post:[illegible]ID:comments[illegible]ID[illegible]42[illegible]

```
# [illegible]
$serializedComment = serialize($author, $email, $time, $content)
LPUSH post:42:comments, $serializedComment
```

[illegible]LRANGE[illegible]

3.4.4 [illegible]

1[illegible]/[illegible]

LINDEX key index

LSET key index value

[illegible]LINDEX[illegible]LINDEX[illegible]0[illegible]

```
redis> LINDEX numbers 0
"2"
```

[illegible]index[illegible]−1[illegible]

```
redis> LINDEX numbers -1
"0"
```

LSET[illegible]index[illegible]value[illegible]

```
redis> LSET numbers 1 7
OK
redis> LINDEX numbers 1
"7"
```

2[illegible]

LTRIM key start end

LTRIM [illegible]LRANGE[illegible]

```
redis> LRANGE numbers 0 -1
1) "1"
2) "2"
3) "7"
```

```
4) "3"
"0"
redis> LTRIM numbers 1 2
OK
redis> LRANGE numbers 0 1
1) "2"
2) "7"
```

LTRIM[illegible]LPUSH[illegible]100[illegible]LTRIM[illegible]

```
LPUSH logs $newLog
LTRIM logs 0 99
```

3[illegible]

```
LINSERT key BEFORE|AFTER pivot value
```

LINSERT [illegible] pivot [illegible] BEFORE[illegible]AFTER[illegible]value[illegible]

LINSERT[illegible]

```
redis> LRANGE numbers 0 -1
1) "2"
2) "7"
3) "0"
redis> LINSERT numbers AFTER 7 3
(integer) 4
redis> LRANGE numbers 0 -1
1) "2"
2) "7"
3) "3"
4) "0"
```

```
redis> LINSERT numbers BEFORE 2 1
(integer) 5
redis> LRANGE numbers 0 -1
1) "1"
2) "2"
3) "7"
4) "3"
5) "0"
```

4□□□□□□□□□□□□□□□□

RPOPLPUSH source destination

RPOPLPUSH□□□□□□□□□□□□□□□□□□□□□□□□□□RPOP□□□□□LPUSH□□□RPOPLPUSH□□□□□source□□□□□□□□□□□□□□□□□□□□□□destination□□

```
def rpoplpush ($source, $destination)
    $value = RPOP $source
    LPUSH $destination, $value
    return $value
```

□□□□□□□□□□□□□□RPOPLPUSH □□□□□□□□□□□□□□□□□□□□source□destination□□□□RPOPLPUSH□□□RPOPLPUSH □□□□□□□□□□□□□□□□□□□□□RPOPLPUSH□□

3.5 □□□□

□□□□□□□□□□„„□□□Redis□□□□□□tag□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis□□

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3.5.1 □□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□set□□□□□□232 −1□□□□□□□□□□□□□□□□□□

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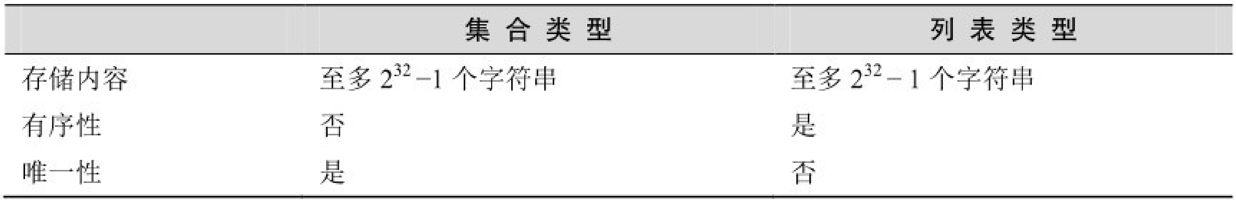
□3-4 □□□□□□□□



	集合类型	列表类型
存储内容	至多 $2^{32}-1$ 个字符串	至多 $2^{32}-1$ 个字符串
有序性	否	是
唯一性	是	否

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□hash table□□□□□□□□□□□□□□O(1)□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

3.5.2 □□

1□□/□□□

SADD key member [member …]

SREM key member [member …]

SADD □□□

□□□□□□□□□□□□□□□□

```
redis> SADD letters a
(integer) 1
redis> SADD letters a b c
(integer) 2
```

□□□SADD□□□□□□□2□□□□□“a”□□□□□□□□□□□□□□□□□□□

SREM□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> SREM letters c d
(integer) 1
```

□□□□“d”□□□□□□□□□□□□□□□□□□□□□□□1□

2□□□□□□□□□□□

SMEMBERS key

SMEMBERS□□□□□□□□□□□□□□□□□

```
redis> SMEMBERS letters
1) "b"
2) "a"
```

3□□□□□□□□□□□

SISMEMBER key member

□□□□□□□□□□□□□□□□□□□□□O(1)□□□□□□□□□□□□□□□□SISMEMBER□□□□□□□□□□□□□□□□□□□ SISMEMBER□□□□1□□□□□□□□□□□□□□0□□□□

```
redis> SISMEMBER letters a
(integer) 1
redis> SISMEMBER letters d
(integer) 0
```

4□□□□□□

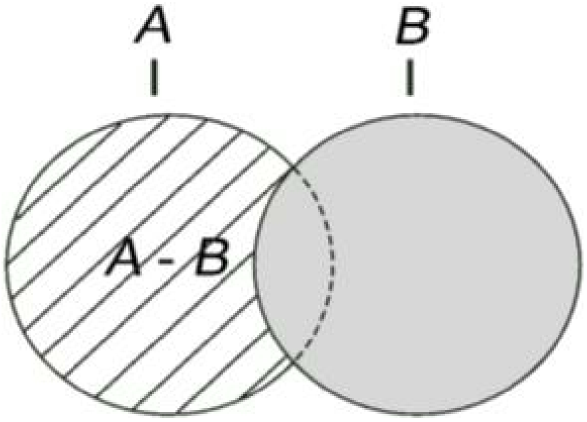
SDIFF key [key „]

SINTER key [key „]

SUNION key [key „]

□□□□□□□3□□□□□□□□□□□□□□□□□□

□1□SDIFF□□□□□□□□□□□□□□□□□□A□□□B□□□□□□A−B□□□□□□□A□□□□B□□□□□□□□□□□3-13□□□□□A−B ={x | x∈A□x∈B}□□□□



□3-13 □□□□□□□□A−B

{1, 2, 3} - {2, 3, 4} = {1}

{2, 3, 4} - {1, 2, 3} = {4}

SDIFF□□□□□□□□□□

```
redis> SADD setA 1 2 3
(integer) 3
redis> SADD setB 2 3 4
(integer) 3
redis> SDIFF setA setB
1) "1"
redis> SDIFF setB setA
1) "4"
```

SDIFF□□□□□□□□□□□□□□□

```
redis> SADD setC 2 3
(integer) 2
```

```
redis> SDIFF setA setB setC
1) "1"
```

□□□□□□□□ setA - setB□□□□□□□ setC□□□□

□2□SINTER□□□□□□□□□□□□□□□□□□A□□□B□□□□□□A ∩ B□□□□□□□A □□□B□□□□□□□□□□□3-14□□□□□A ∩ B ={x | x ∈ A □x ∈B}□□□□

{1, 2, 3} ∩ {2, 3, 4} = {2, 3}

SINTER□□□□□□□□□□

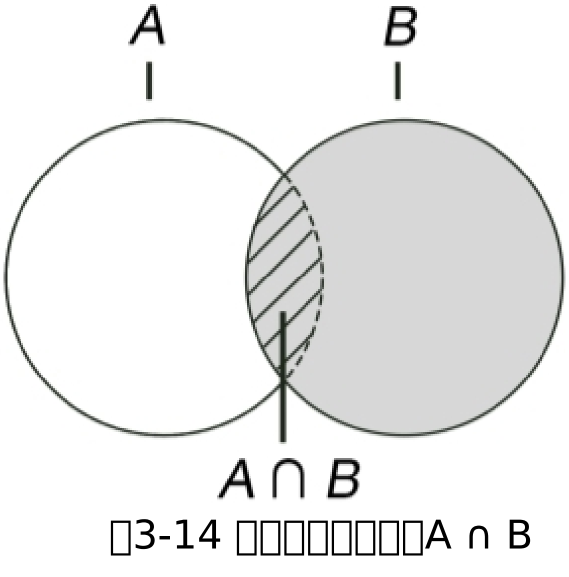
```
redis> SINTER setA setB
1) "2"
2) "3"
```

SINTER□□□□□□□□□□□□□□□□

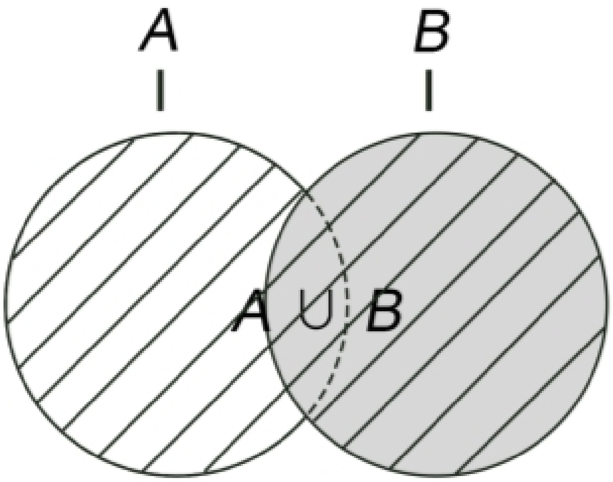
```
redis> SINTER setA setB setC
1) "2"
2) "3"
```

□3□SUNION□□□□□□□□□□□□□□□□□□A□□□B□□□□□□A∪B□□□□□□□A □□□B□□□□□□□□□□□3-15□□□□A∪B ={x | x∈A□x ∈B}□□□□

{1, 2, 3} ∪{2, 3, 4} = {1, 2, 3, 4}



□3-14 □□□□□□□□A ∩ B



[illegible]3-15 [illegible]A ∪ B

SUNION[illegible]

```
redis> SUNION setA setB
1) "1"
2) "2"
3) "3"
4) "4"
```

SUNION[illegible]

```
redis> SUNION setA setB setC
1) "1"
2) "2"
3) "3"
4) "4"
```

3.5.3 [illegible]

1[illegible]

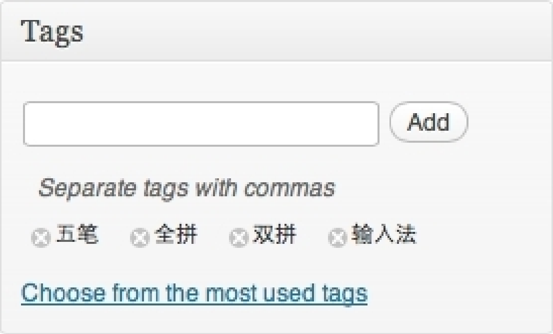
[illegible]

[illegible]post:[illegible]ID:tags[illegible]

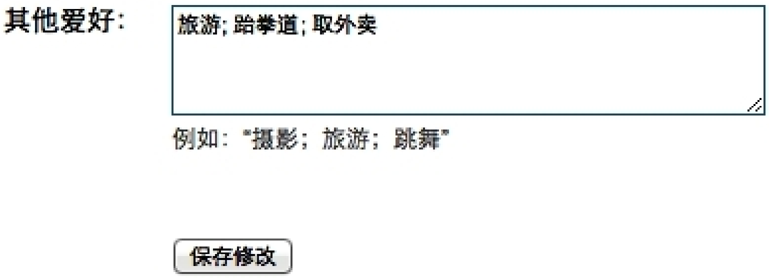
```
# □ ID □ 42 □□□□□□□□
SADD post:42:tags, □□□□, □□□□, Java
# □□□□□
SREM post:42:tags, □□□□
# □□□□□□□:
$tags = SMEMBERS post:42:tags
print $tags
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ WordPress□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 3-16 □□□□□□□□□□□SADD□SREM□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3-17□□□



□3-16 □WordPress □□□□□□□



旅游; 跆拳道; 取外卖

例如："摄影；旅游；跳舞"

□3-17 □□□□□□□□□□

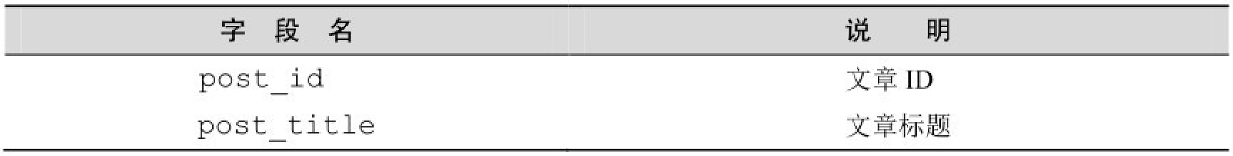
□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□□□□□□□□□
3.4 □□□

2□□□□□□□□□

□□

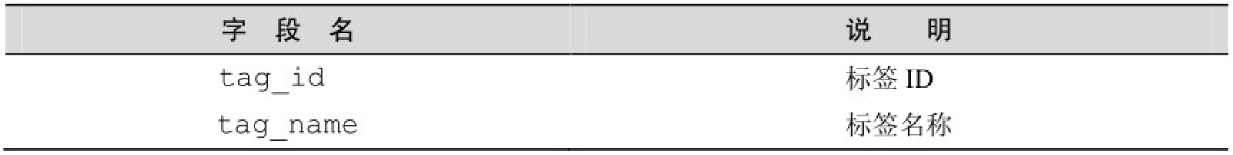
□□3□□□□posts□tags□posts_tags□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3-5□□3-6□□3-7□□□

□3-5 posts □□□



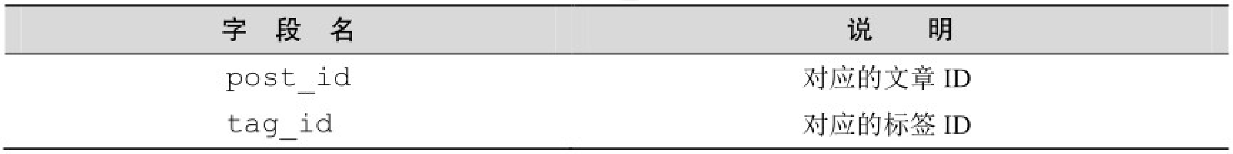
字段名	说明
post_id	文章 ID
post_title	文章标题

□3-6 tags □□□



字段名	说明
tag_id	标签 ID
tag_name	标签名称

□3-7 posts_tags □□□



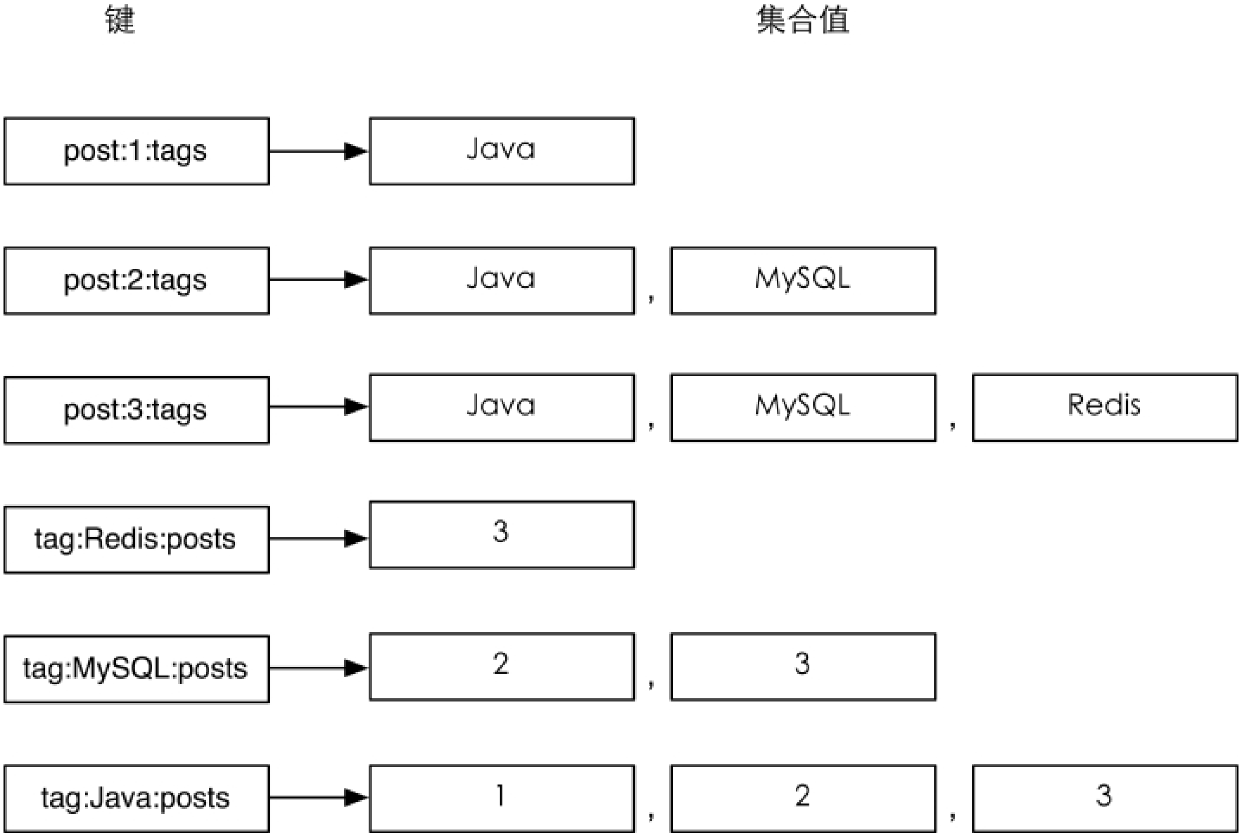
字段名	说明
post_id	对应的文章 ID
tag_id	对应的标签 ID

□□□□□□□□“Java”□“MySQL”□“Redis”□3□□□□□□□□□□□□□□SQL□□□

```
SELECT p.post_title
FROM posts_tags pt,
   posts p,
   tags t
WHERE pt.tag_id = t.tag_id
   AND (t.tag_name IN ('Java', 'MySQL', 'Redis'))
   AND p.post_id = pt.post_id
GROUP BY p.post_id HAVING COUNT(p.post_id)=3;
```

□□□□□□□□□□ SQL □□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□tag:□□□□:posts□□□□□□□□□□□□□□□□ID□□□□□□□□3□□□□ID□□□1□2□3□□□ID□1□□□□□□“Java”□ID □ 2 □□□□□□“Java”□“MySQL”□ID □ 3 □□□□□□“Java”□“MySQL”□“Redis”□□□□□□□□□□□□□□3-18□□[12]□



□3-18 □□□□□□□□□□□□

□□□□□□□□□□□□“MySQL”□□□□□□□□□□□□□ SMEMBERS tag:MySQL:posts□□□□□□□□□□□□□□Java□MySQL□Redis 3 □□□□□□□□□□□tag:Java:posts□tag:MySQL:posts□tag:Redis:posts□3□□□□□□□□SINTER□□□□□□□□□

3.5.4 □□□□

1[illegible]

SCARD key

SCARD[illegible]

```
redis> SMEMBERS letters
1) "b"
2) "a"
redis> SCARD letters
(integer) 2
```

2[illegible]

SDIFFSTORE destination key [key …]

SINTERSTORE destination key [key …]

SUNIONSTORE destination key [key …]

SDIFFSTORE[illegible]SDIFF[illegible]destination[illegible]

SDIFFSTORE[illegible]

SINTERSTORE[illegible]SUNIONSTORE[illegible]

3[illegible]

SRANDMEMBER key [count]

SRANDMEMBER[illegible]

```
redis> SRANDMEMBER letters
"a"
redis> SRANDMEMBER letters
"b"
redis> SRANDMEMBER letters
"a"
```

[illegible]count[illegible]count[illegible]

（1）如果count为正数时，SRANDMEMBER会随机从集合里获得count个不重复的元素。如果count的值大于集合中的元素个数，则SRANDMEMBER会返回集合中的全部元素。

（2）当count为负数时，SRANDMEMBER会随机从集合里获得|count|个的元素，这些元素有可能相同。

为了示例，我们先在letters集合中加入两个元素：

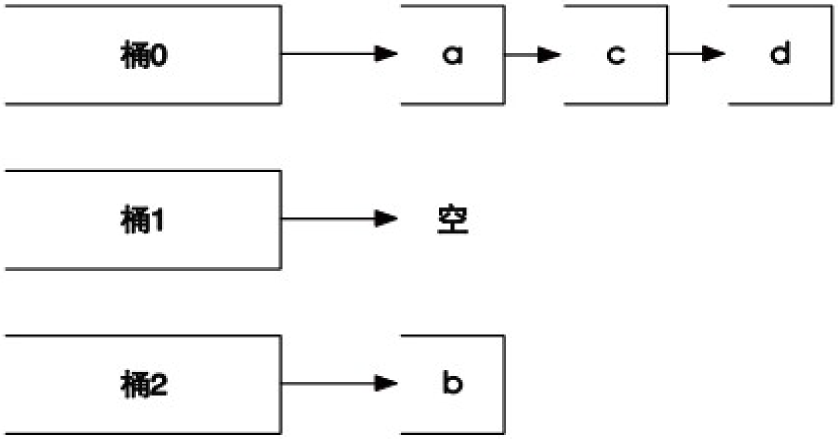
```
redis> SADD letters c d (integer) 2
```

此时 letters 集合中共有“a”、“b”、“c”、“d”4 个元素，下面使用不同的参数对SRANDMEMBER命令进行测试：

```
redis> SRANDMEMBER letters 2
1) "a"
2) "c"
redis> SRANDMEMBER letters 2
1) "a"
2) "b"
redis> SRANDMEMBER letters 100
1) "b"
2) "a"
3) "c"
4) "d"
redis> SRANDMEMBER letters -2
1) "b"
2) "b"
redis> SRANDMEMBER letters -10
1) "b"
2) "b"
3) "c"
4) "c"
```

```
5) "b"
6) "a"
7) "b"
8) "d"
9) "b"
10) "b"
```

[illegible] SRANDMEMBER [illegible]SRANDMEMBER letters -10[illegible]b [illegible][13] [illegible]O(1)[illegible]b[illegible]b[illegible]0[illegible]b[illegible]0[illegible]bucket[illegible]b[illegible]b[illegible] b[illegible]Redis [illegible]SRANDMEMBER[illegible]Redis[illegible]3-19[illegible]



[illegible]3-19 Redis [illegible]3 [illegible]b[illegible]

4[illegible]

```
SPOP key
```

3.4[illegible]LPOP[illegible]SPOP[illegible] SPOP[illegible]

```
redis> SPOP letters
"b"
redis> SMEMBERS letters
1) "a"
2) "c"
3) "d"
```

3.6 [illegible]

[illegible] Redis [illegible]

[illegible] ID [illegible]

[illegible]

[illegible]——[illegible]

3.6.1 [illegible]

[illegible]sorted set[illegible]“[illegible]”[illegible]

[illegible]N[illegible]

[illegible]

[illegible]1[illegible]

[illegible]2[illegible]

[illegible]

[illegible]1[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]2[illegible]Skip list[illegible]O(log(N))[illegible]

[illegible]3[illegible]

[illegible]4[illegible]

[illegible]Redis[illegible]5[illegible]

3.6.2 [illegible]

1[illegible]

ZADD key score member [score member …]

ZADD [illegible]ZADD[illegible]

[illegible]Tom[illegible]Peter[illegible]David[illegible]89[illegible]67[illegible]100[illegible]

```
redis> ZADD scoreboard 89 Tom 67 Peter 100 David
(integer) 3
```

[illegible]Peter[illegible]76[illegible]ZADD[illegible]Peter[illegible]

```
redis> ZADD scoreboard 76 Peter
(integer) 0
```

[illegible]

```
redis> ZADD testboard 17E+307 a
(integer) 1
redis> ZADD testboard 1.5 b
(integer) 1
redis> ZADD testboard +inf c
(integer) 1
redis> ZADD testboard -inf d
(integer) 1
```

[illegible]+inf[illegible]-inf[illegible]

2[illegible]

```
ZSCORE key member
```

[illegible]

```
redis> ZSCORE scoreboard Tom
"89"
```

3[illegible]

```
ZRANGE key start stop [WITHSCORES]
ZREVRANGE key start stop [WITHSCORES]
```

ZRANGE[illegible] start[illegible]stop[illegible]ZRANGE[illegible]LRANGE[illegible]0[illegible]−1[illegible]

```
redis> ZRANGE scoreboard 0 2
1) "Peter"
2) "Tom"
3) "David"
redis> ZRANGE scoreboard 1 -1
1) "Tom"
```

```
2) "David"
```

□□□□□□□□□□□□□□□□□□ ZRANGE □□□□□□□ WITHSCORES □□□□□□□□□□□□□□“□□1, □□2, „, □□n”□□□“□□1, □□1, □□2, □□2, „, □□n, □□n”□□□□

```
redis> ZRANGE scoreboard 0 -1 WITHSCORES
1) "Peter"
2) "76"
3) "Tom"
4) "89"
5) "David"
6) "100"
```

ZRANGE□□□□□□□□□O(log n+m)□□□n□□□□□□□□□m□□□□□□□□□□

□□□□□□□□□□□□Redis□□□□□□□□□"0"<"9"<"A"<"Z"<"a"<"z"□□□UTF-8□□□

```
redis> ZADD chineseName 0 □□ 0 □□ 0 □□□ 0 □□
(integer) 4
redis> ZRANGE chineseName 0 -1
1) "\xe5\x88\x98\xe5\xa2\x89"
2) "\xe5\x8f\xb8\xe9\xa9\xac\xe5\x85\x89"
3) "\xe8\xb5\xb5\xe5\x93\xb2"
4) "\xe9\xa9\xac\xe5\x8d\x8e"
```

□□□□Redis□□□□□□□□□□□□□□□

ZREVRANGE□□□ZRANGE□□□□□□□ZREVRANGE□□□□□□□□□□□□□□□□□□□□□□

4□□□□□□□□□□□□

ZRANGEBYSCORE key min max [WITHSCORES] [LIMIT offset count]

ZRANGEBYSCORE □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□min□max□□□□□min□max□□□□□

```
redis> ZRANGEBYSCORE scoreboard 80 100
1) "Tom"
2) "David"
```

□□□□□□□□□□□□□□□□□□□□□□□“(”□□□□□□□□□”80□□100□□□□□□□□80□□□□□□100□□□□□□□□□□□□□□□□□

```
redis> ZRANGEBYSCORE scoreboard 80 (100
1) "Tom"
```

min□max□□□□□□□□ZADD□□□□□-inf□+inf□□□□□□□□□□□□□□□□□□□□□□□□□80□□□□□80□□+inf□□

```
redis> ZRANGEBYSCORE scoreboard (80 +inf
1) "Tom"
2) "David"
```

WITHSCORES□□□□□□ZRANGE□□□□□□□□□□

□□ SQL □□□□□□ LIMIT offset count □□□□□□□□□□ LIMIT offset count □ SQL □□□□□□□□□□□□□□□□□□□□□□□□□□offset□□□□□□□□□□count□□□□□□□□□□□□□□□scoreboard□□□□□□□□□

```
redis> ZADD scoreboard 56 Jerry 92 Wendy 67 Yvonne
(integer) 3
```

□□scoreboard□□□□□□□□□

```
redis> ZRANGE scoreboard 0 -1 WITHSCORES
1) "Jerry"
2) "56"
```

```
3) "Yvonne"
4) "67"
5) "Peter"
6) "76"
7) "Tom"
8) "89"
9) "Wendy"
10) "92"
11) "David"
12) "100"
```

[illegible]60[illegible]3[illegible]

```
redis> ZRANGEBYSCORE scoreboard 60 +inf LIMIT 1 3
1) "Peter"
2) "Tom"
3) "Wendy"
```

[illegible] 100 [illegible] 3 [illegible] ZREVRANGEBYSCORE[illegible]ZRANGE[illegible]ZREVRANGE[illegible] ZREVRANGEBYSCORE [illegible] ZREVRANGEBYSCORE [illegible] min[illegible] max[illegible]ZRANGEBYSCORE[illegible]

```
redis> ZREVRANGEBYSCORE scoreboard 100 0 LIMIT 0 3
1) "David"
2) "Wendy"
3) "Tom"
```

5[illegible]

```
ZINCRBY key increment member
```

ZINCRBY [illegible] Jerry[illegible]4[illegible]

```
redis> ZINCRBY scoreboard 4 Jerry
"60"
```

increment[illegible]Jerry[illegible]4[illegible]

```
redis> ZINCRBY scoreboard -4 Jerry
"56"
```

[illegible]Redis [illegible] 0 [illegible]

3.6.3 [illegible]

1[illegible]

[illegible] ID [illegible]posts:page.view[illegible] ZINCRBY posts:page. view 1 [illegible] ID[illegible]

[illegible]

```
$postsPerPage = 10
$start = ($currentPage - 1) * $postsPerPage
$end = $currentPage * $postsPerPage - 1
$postsID = ZREVRANGE posts:page.view, $start[illegible]$end
for each $id in $postsID
   $postData = HGETALL post:$id
   print [illegible]$postData.title
```

[illegible]3.2[illegible]post:[illegible]ID:page.view[illegible] ZSCORE posts:page. view [illegible] ID [illegible]

2[illegible]

3.4[illegible]ID[illegible]posts:list[illegible]

[illegible]

[illegible]ID[illegible]Unix[illegible][14][illegible]

[illegible] ZREVRANGEBYSCORE [illegible]WordPress[illegible]

3.6.4 [illegible]

1[illegible]

```
ZCARD key
```

[illegible]

```
redis> ZCARD scoreboard
(integer) 6
```

2[illegible]

```
ZCOUNT key min max
```

[illegible]

```
redis> ZCOUNT scoreboard 90 100
(integer) 2
```

ZCOUNT[illegible]min[illegible]max[illegible]ZRANGEBYSCORE[illegible]

```
redis> ZCOUNT scoreboard (89 +inf
(integer) 2
```

3[illegible]

```
ZREM key member [member …]
```

ZREM[illegible]

```
redis> ZREM scoreboard Wendy
(integer) 1
redis> ZCARD scoreboard
```

```
(integer) 5
```

4□□□□□□□□□□□

ZREMRANGEBYRANK key start stop

ZREMRANGEBYRANK □□□□□□□□□□□□□□□□□□□ 0□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> ZADD testRem 1 a 2 b 3 c 4 d 5 e 6 f
(integer) 6
redis> ZREMRANGEBYRANK testRem 0 2
(integer) 3
redis> ZRANGE testRem 0 -1
1) "d"
2) "e"
3) "f"
```

5□□□□□□□□□□□

ZREMRANGEBYSCORE key min max

ZREMRANGEBYSCORE□□□□□□□□□□□□□□□□□□□□min□max□□□□ZRANGEBYSCORE□□□□□□□□□□□□□□□□□□□□□

```
redis> ZREMRANGEBYSCORE testRem (4 5
(integer) 1
redis> ZRANGE testRem 0 -1
1) "d"
2) "f"
```

6□□□□□□□□

ZRANK key member

ZREVRANK key member

ZRANK□□□□□□□□□□□□□□□□□□□□□□□□□□□□0□□□□□□□□□□□□□□0□□□□

```
redis> ZRANK scoreboard Peter
(integer) 0
```

ZREVRANK[illegible]0[illegible]

```
redis> ZREVRANK scoreboard Peter
(integer) 4
```

7[illegible]

```
ZINTERSTORE destination numkeys key [key …] [WEIGHTS weight [weight …]] [AGGREGATE SUM|MIN|MAX]
```

ZINTERSTORE[illegible]destination[illegible]destination[illegible]

destination[illegible]AGGREGATE[illegible]

[illegible]1[illegible]AGGREGATE[illegible]SUM[illegible]destination[illegible]

```
redis> ZADD sortedSets1 1 a 2 b
(integer) 2
redis> ZADD sortedSets2 10 a 20 b
(integer) 2
redis> ZINTERSTORE sortedSetsResult 2 sortedSets1 sortedSets2
(integer) 2
redis> ZRANGE sortedSetsResult 0 -1 WITHSCORES
1) "a"
2) "11"
3) "b"
4) "22"
```

□2□□AGGREGATE□MIN□□destination□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> ZINTERSTORE sortedSetsResult 2 sortedSets1 sortedSets2 AGGREGATE MIN
(integer) 2
redis> ZRANGE sortedSetsResult 0 -1 WITHSCORES
1) "a"
2) "1"
3) "b"
4) "2"
```

□3□□AGGREGATE□MAX□□destination□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> ZINTERSTORE sortedSetsResult 2 sortedSets1 sortedSets2 AGGREGATE MAX
(integer) 2
redis> ZRANGE sortedSetsResult 0 -1 WITHSCORES
1) "a"
2) "10"
3) "b"
4) "20"
```

ZINTERSTORE□□□□□□□WEIGHTS□□□

```
redis> ZINTERSTORE sortedSetsResult 2 sortedSets1 sortedSets2 WEIGHTS 1 0.1
(integer) 2
redis> ZRANGE sortedSetsResult 0 -1 WITHSCORES
1) "a"
```

```
2) "2"
3) "b"
4) "4"
```

[illegible]ZINTERSTORE[illegible]ZUNIONSTORE[illegible]

[illegible]

[1]. [illegible]“[illegible]WordPress [illegible]”[illegible]WordPress [illegible]

[2]. Redis [illegible] 512 MB [illegible]Redis[illegible]512 MB [illegible]

[3]. [illegible]

[4]. [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[5]. [illegible]

[6]. MessagePack [illegible] JSON [illegible]MessagePack[illegible]http://msgpack.org[illegible]

[7]. http://twitter.github.com/bootstrap[illegible]

[8]. [illegible]Object-Relational Mapping[illegible]

[9]. [illegible]SET[illegible]

[10]. HSETNX [illegible]“NX”[illegible]“if Not eXists”[illegible]

[11]. 4.5 [illegible]

[12]. [illegible]3-18[illegible]

[13]. [illegible]

[14]. Unix [illegible]UTC [illegible]1970 [illegible]1 [illegible]1 [illegible]0 [illegible]0 [illegible]0 [illegible]1970 [illegible]Unix[illegible]1970[illegible]

[illegible]4[illegible] [illegible]

[illegible]Redis[illegible]Redis[illegible]„„

[illegible]Redis[illegible]Redis[illegible]Redis[illegible]

4.1 [illegible]

[illegible]5[illegible]

[illegible]“Powered by Redis”[illegible]

[illegible]Redis[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]Redis[illegible]“user:[illegible]ID:followers”[illegible]“user:[illegible]ID:following”[illegible]

```
def follow($currentUser, $targetUser)
    SADD user:$currentUser:following, $targetUser
    SADD user:$targetUser:followers, $currentUser
```

□ID □1□□□A □□□ID □2□□□B□□□□□□ follow(1, 2)□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□A□□□□□□□□□□□□□□□□□□B□□B□□□□□□□□□□□□□□□□A□□□□□□□□A□□□□□B□□□□B□“□□”□□□□□ A□B□□□□□□□□□□□□□□□□□□□□□□□

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□□□□□□Redis□□□□□□□□□□□

4.1.1 □□

Redis□□□□□transaction□□□□□□□□□□□□□□□□□□□ Redis □□□A□B□□□□□□□□A□□□□□□□□□□□□B□□□

□□□□□□□□□□□□□□□□□□□□Redis□□□□□Redis□□□□□□□□□□□□

```
redis> MULTI
OK
redis> SADD "user:1:following" 2
QUEUED
redis> SADD "user:2:followers" 1
QUEUED
redis> EXEC
1) (integer) 1
2) (integer) 1
```

□□□□□□□□□□□□□□□□□□□□MULTI□□□□Redis□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”Redis□□□“OK□”

[illegible] SADD[illegible] Redis [illegible]QUEUED[illegible]

[illegible] Redis [illegible] EXEC [illegible]Redis[illegible]QUEUED[illegible]EXEC [illegible]

Redis[illegible]EXEC[illegible] Redis [illegible]EXEC[illegible]Redis[illegible]

[illegible]Redis [illegible]A[illegible]B[illegible]B[illegible]A[illegible]

4.1.2 [illegible]

[illegible]Redis [illegible]

[illegible]1[illegible]

```
redis> MULTI
OK
redis> SET key value
QUEUED
redis> SET key
(error) ERR wrong number of arguments for 'set' command
redis> ERRORCOMMAND key
(error) ERR unknown command 'ERRORCOMMAND'
redis> EXEC
```

```
(error) EXECABORT Transaction discarded because of previous errors.
```

[illegible]MULTI[illegible]3[illegible] EXEC [illegible] Redis [illegible]

[illegible] Redis 2.6.5 [illegible]SET key value[illegible]EXEC[illegible]

```
1) OK
```

[illegible]2[illegible] Redis [illegible] Redis [illegible]

```
redis> MULTI
OK
redis> SET key 1
QUEUED
redis> SADD key 2
QUEUED
redis> SET key 3
QUEUED
redis> EXEC
1) OK
2) (error) WRONGTYPE Operation against a key holding the wrong kind of value
3) OK
redis> GET key
"3"
```

[illegible] SADD key 2[illegible] SET key 3[illegible]

Redis[illegible]rollback[illegible][1] [illegible]

[illegible] Redis [illegible] Redis [illegible]

4.1.3 WATCH[illegible]

[illegible]INCR[illegible]GET[illegible]SET[illegible]incr[illegible]

```
def incr($key)
   $value = GET $key
   if not $value
      $value = 0
   $value = $value + 1
   SET $key, $value
   return $value
```

[illegible]incr[illegible]SET[illegible]GET[illegible]1[illegible]

[illegible]GET[illegible]WATCH[illegible]WATCH [illegible] EXEC [illegible] EXEC [illegible] MULTI [illegible]WATCH[illegible]

```
redis> SET key 1
```

```
OK
redis> WATCH key
OK
redis> SET key 2
OK
redis> MULTI
OK
redis> SET key 3
QUEUED
redis> EXEC
(nil)
redis> GET key
"2"
```

[illegible] WATCH[illegible]key[illegible] SET key 2[illegible] SET key 3[illegible]EXEC[illegible]

[illegible]WATCH[illegible]incr[illegible]

```
def incr($key)
   WATCH $key
   $value = GET $key
      if not $value
         $value = 0
      $value = $value + 1
   MULTI
   SET $key, $value
      result = EXEC
   return result[0]
```

[illegible]EXEC[illegible]result[0][illegible]

[illegible] [illegible]WATCH[illegible]EXEC[illegible]

[illegible] EXEC [illegible]UNWATCH[illegible]hsetxx[illegible]HSETNX[illegible]

```
def hsetxx($key, $field, $value)
  WATCH $key
  $isFieldExists = HEXISTS $key, $field
  if $isFieldExists is 1
    MULTI
    HSET $key, $field, $value
    EXEC
  else
    UNWATCH
  return $isFieldExists
```

[illegible]UNWATCH[illegible]

4.2 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]Request timeout[illegible]

[illegible]

□□□IP□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□„„

4.2.1 □□□□

□□Redis□□□□□ EXPIRE□□□□□□□□□□□□□□□Redis□□□□□□

EXPIRE □□□□□□□ EXPIRE key seconds□□□ seconds □□□□□□□□□□□□□□□□□□□□session:29e3d□□15□□□□□□

```
redis> SET session:29e3d uid1314
OK
redis> EXPIRE session:29e3d 900
(integer) 1
```

EXPIRE□□□□1□□□□□□□□0□□□□□□□□□□□□□□

```
redis> DEL session:29e3d
(integer) 1
redis> EXPIRE session:29e3d 900
(integer) 0
```

□□□□□□□□□□□□□□□□□□□□□□TTL□□□□□□□□□□□□□□□□□□

```
redis> SET foo bar
OK
redis> EXPIRE foo 20
(integer) 1
```

```
redis> TTL foo
(integer) 15
redis> TTL foo
(integer) 7
redis> TTL foo
(integer) –2
```

[illegible]foo[illegible]20[illegible]foo[illegible]TTL[illegible]−2[illegible]

[illegible]−1[illegible]

```
redis> SET persistKey value
OK
redis> TTL persistKey
```

[illegible]2.6[illegible]−1[illegible]2.8[illegible]−2[illegible]−1[illegible]

```
(integer) –1
```

[illegible]PERSIST[illegible]1[illegible]0[illegible]

```
redis> SET foo bar
OK
redis> EXPIRE foo 20
(integer) 1
redis> PERSIST foo
(integer) 1
redis> TTL foo
(integer) –1
```

□□PERSIST□□□□□□□SET□GETSET□□□□□□□□□□□□□□□□□□□□□□

```
redis> EXPIRE foo 20
(integer) 1
redis> SET foo bar
OK
redis> TTL foo
(integer) –1
```

□□EXPIRE□□□□□□□□□□□□□□□□□□□

```
redis> SET foo bar
OK
redis> EXPIRE foo 20
(integer) 1
redis> TTL foo
(integer) 15
redis> EXPIRE foo 20
(integer) 1
redis> TTL foo
(integer) 17
```

□□□□□□□□□□□□□□□INCR□LPUSH□HSET□ZREM□□□□□□□□□□□□□

EXPIRE□□□seconds□□□□□□□□□□□□□□□1□□□□□□□□□□□□□□□□□□□□□□ PEXPIRE□□□PEXPIRE□□□ EXPIRE□□□□□□□□□□□□□□□□□□PEXPIRE key 1000 □ EXPIRE key 1 □□□□□□□□□ PTTL□□□□□□□□□□□□□□□□□

□□ □□□□ WATCH□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□WATCH□□□□□□□□□□

[illegible]EXPIREAT[illegible]PEXPIREAT[illegible]

EXPIREAT[illegible]EXPIRE[illegible]Unix[illegible]PEXPIREAT[illegible]EXPIREAT[illegible]

```
redis> SET foo bar
OK
redis> EXPIREAT foo 1351858600
(integer) 1
redis> TTL foo
(integer) 142
redis> PEXPIREAT foo 1351858700000
(integer) 1
```

4.2.2 [illegible]

[illegible]IP[illegible]EXPIRE[illegible]

[illegible]100[illegible]rate.limiting:[illegible] IP[illegible] INCR[illegible]1[illegible]1[illegible]100[illegible]

[illegible]

```
$isKeyExists = EXISTS rate.limiting:$IP
if $isKeyExists is 1
   $times = INCR rate.limiting:$IP
   if $times > 100
      print [illegible]
```

```
    exit
else
  INCR rate.limiting:$IP
  EXPIRE $keyName, 60
```

[illegible]IP[illegible]100[illegible]

[illegible]

```
$isKeyExists = EXISTS rate.limiting:$IP
if $isKeyExists is 1
  $times = INCR rate.limiting:$IP
  if $times > 100
    print [illegible]
    exit
else
  MULTI
  INCR rate.limiting:$IP
  EXPIRE $keyName, 60
  EXEC
```

4.2.3 [illegible]

[illegible]4.2.2[illegible]9[illegible]10[illegible]2[illegible]19[illegible]10[illegible]10[illegible]10[illegible]

[illegible] 10 [illegible] 1[illegible]1[illegible]10[illegible]

[illegible]

```
$listLength = LLEN rate.limiting:$IP
if $listLength < 10
   LPUSH rate.limiting:$IP, now()
else
   $time = LINDEX rate.limiting:$IP, -1
   if now() - $time < 60
      print [illegible]
   else
      LPUSH rate.limiting:$IP, now()
      LTRIM rate.limiting:$IP, 0, 9
```

[illegible] now()[illegible] Unix [illegible]“A[illegible]B[illegible]”[illegible]“B”[illegible]6[illegible]

4.2.4 [illegible]

[illegible]CPU[illegible]IO[illegible]10[illegible] Redis [illegible]

```
$rank = GET cache:rank
if not $rank
```

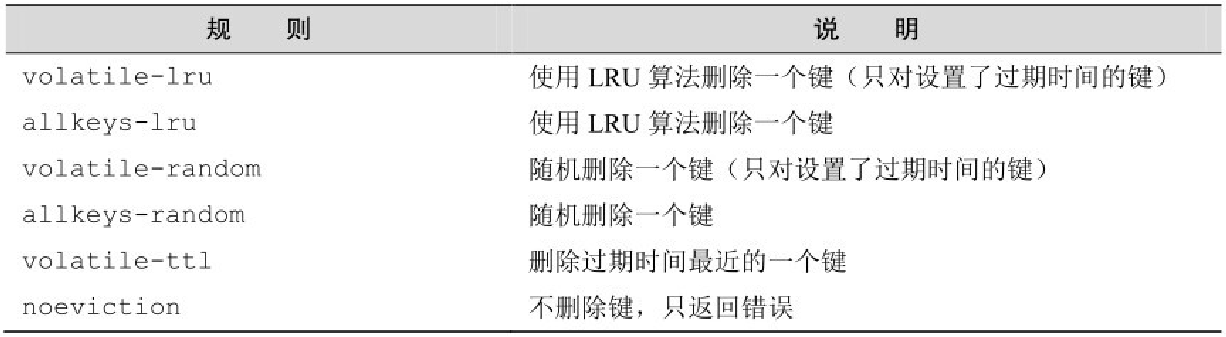
```
$rank = □□□□...
MUlTI
SET cache:rank, $rank
EXPIRE cache:rank, 7200
EXEC
```

□□□ Redis □□□□□□□□□□□□□□□ Redis □□ Redis □□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□

□□□□□□□□□□□□□□□□maxmemory□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□maxmemory-policy□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□

maxmemory-policy□□□□□□□4-1□□□□□□LRU□Least Recently Used□□□□“□□□□□□”□□□

□4-1 Redis □□□□□□□□□



规　　则	说　　明
volatile-lru	使用 LRU 算法删除一个键（只对设置了过期时间的键）
allkeys-lru	使用 LRU 算法删除一个键
volatile-random	随机删除一个键（只对设置了过期时间的键）
allkeys-random	随机删除一个键
volatile-ttl	删除过期时间最近的一个键
noeviction	不删除键，只返回错误

□□maxmemory-policy□□□allkeys-lru□□□□Redis□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□[2]□□□□□□□□□□□□□□

4.3 □□

[illegible]——[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

“[illegible]50[illegible]SMEMBERS[illegible]

[illegible] SORT [illegible]

4.3.1 [illegible]

[illegible]Redis[illegible]Redis[illegible]Redis[illegible]Redis[illegible]

[illegible]Redis [illegible]ZINTERSTORE[illegible]ZUNIONSTORE[illegible]ZINTER[illegible]ZUNION[illegible]

[illegible]Redis [illegible] MULTI, ZINTERSTORE, ZRANGE, DEL[illegible] EXEC[illegible]5[illegible]ZINTER[illegible]

```
MULTI
ZINTERSTORE tempKey ...
ZRANGE tempKey ...
DEL tempKey
```

EXEC

4.3.2 SORT[illegible]

[illegible] Redis [illegible] SORT[illegible]SORT[illegible]

[illegible]“ruby”[illegible]ID[illegible]“2”[illegible]“6”[illegible]“12”[illegible]“26”[illegible]SMEMBERS[illegible][3][illegible]ID[illegible]SORT[illegible]

```
redis> SORT tag:ruby:posts
1) "2"
2) "6"
3) "12"
4) "26"
```

[illegible]SORT [illegible]

```
redis> LPUSH mylist 4 2 6 1 3 7
(integer) 6
redis> SORT mylist
1) "1"
2) "2"
3) "3"
4) "4"
5) "6"
6) "7"
```

[illegible]

```
redis> ZADD myzset 50 2 40 3 20 1 60 5
```

```
(integer) 4
redis> SORT myzset
1) "1"
2) "2"
3) "3"
4) "5"
```

□□□□□□□□□□SORT□□□□□□□ALPHA□□□□□□□□□□□□□□□□□□□□□□□

```
redis> LPUSH mylistalpha a c e d B C A
(integer) 7
redis> SORT mylistalpha
(error) ERR One or more scores can't be converted into double
redis> SORT mylistalpha ALPHA
1) "A"
2) "B"
3) "C"
4) "a"
5) "c"
6) "d"
7) "e"
```

□□□□□□□□□□□□□□□ALPHA□□□□□SORT□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□SORT □□□SORT□□□DESC□□□□□□□□□□□□□□□□□□□□

```
redis> SORT tag:ruby:posts DESC
1) "26"
```

```
2) "12"
3) "6"
4) "2"
```

[illegible]SORT[illegible]LIMIT[illegible]SQL [illegible]LIMIT offset count[illegible] offset [illegible]count[illegible]

SORT[illegible]

```
redis> SORT tag:ruby:posts DESC LIMIT 1 2
1) "12"
2) "6"
```

4.3.3 BY[illegible]

[illegible]ID[illegible]ID[illegible]ID[illegible]ID[illegible]3.6[illegible]ID[illegible]ID[illegible]4.3.2[illegible]ID[illegible]

[illegible]time[illegible]ID[illegible]“2”[illegible]“6”[illegible]“12”[illegible]“26”[illegible]time[illegible]“1352619200”[illegible]“1352619600”[illegible]“1352620100”[illegible]“1352620000”[illegible]Unix[illegible]“12”[illegible]“26”[illegible]“6”[illegible]“2”[illegible]SORT[illegible]BY[illegible]

BY[illegible]BY[illegible]->[illegible] BY [illegible]SORT [illegible]“*”[illegible]

```
redis> SORT tag:ruby:posts BY post:*->time DESC
1) "12"
```

```
2) "26"
3) "6"
4) "2"
```

□□□□SORT□□□□□post:2□post:6□post:12□post:26□□□□□□□time□□□□□□□□□tag:ruby:posts□□□□□□ID□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> LPUSH sortbylist 2 1 3
(integer) 3
redis> SET itemscore:1 50
OK
redis> SET itemscore:2 100
OK
redis> SET itemscore:3 -10
OK
redis> SORT sortbylist BY itemscore:* DESC
1) "2"
2) "1"
3) "3"
```

□□□□□□□□“*”□□□□□□□□□□□□□□□□SORT □□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
redis> SORT sortbylist BY anytext
1) "3"
2) "1"
3) "2"
```

□□□ anytext □□□□□□□□ anytext □□□□□□□□□□ SORT □□□□LRANGE□□□□□□□□□□□□□□□□□□□□□□□□□□□SORT□□□□□□□□□□□□□□□□4.3.4□□□□□□□□□□□□□

[illegible] SORT [illegible]

```
redis> LPUSH sortbylist 4
(integer) 4
redis> SET itemscore:4 50
OK
redis> SORT sortbylist BY itemscore:* DESC
1) "2"
2) "4"
3) "1"
4) "3"
```

[illegible]"4"[illegible]itemscore:4[illegible]"1"[illegible]itemscore:1[illegible]50[illegible]SORT[illegible]"4"[illegible]"1"[illegible]

[illegible]0[illegible]

```
redis> LPUSH sortbylist 5
(integer) 5
redis> SORT sortbylist BY itemscore:* DESC
1) "2"
2) "4"
3) "1"
4) "5"
5) "3"
```

[illegible]"5"[illegible]"3"[illegible]"5"[illegible] 0[illegible]"3"[illegible] −10[illegible]

[illegible] [illegible]“*”[illegible]“->”[illegible]“->”[illegible]

```
redis> SORT sortbylist BY somekey->somefield:*
```

```
1) "1"
2) "2"
3) "3"
4) "4"
5) "5"
```

[illegible] SORT [illegible] Redis [illegible] “*”[illegible] somekey->somefield:*[illegible]“*”[illegible]Redis [illegible]somekey[illegible] somefield:*[illegible]“*”[illegible]Redis[illegible]

4.3.4 GET[illegible]

[illegible] ID [illegible]ID[illegible]HGET[illegible]SORT[illegible]GET[illegible]

GET[illegible] SORT[illegible]GET[illegible]GET[illegible]BY[illegible]GET[illegible]“*”[illegible]ID[illegible]

```
redis> SORT tag:ruby:posts BY post:*->time DESC GET post:*->title
1) "Windows 8 app designs"
2) "RethinkDB - An open-source distributed database built with love"
3) "Uses for cURL"
4) "The Nature of Ruby"
```

[illegible]SORT[illegible]GET[illegible]BY[illegible]

```
redis> SORT tag:ruby:posts BY post:*->time DESC GET post:*->title GET post:*->time
1) "Windows 8 app designs"
2) "1352620100"
4) "1352620000"
3) "RethinkDB - An open-source distributed database built with love"
4) "1352620000"
5) "Uses for cURL"
6) "1352619600"
7) "The Nature of Ruby"
8) "1352619200"
```

□□□N□GET□□□□□□□□□□□□□□N□□□□□□□□□□□□□□□□□□ID □□□□□□□□□□ GET #□□□□□□

```
redis> SORT tag:ruby:posts BY post:*->time DESC GET post:*->title GET post:*->time GET #
1) "Windows 8 app designs"
2) "1352620100"
3) "12"
4) "RethinkDB - An open-source distributed database built with love"
5) "1352620000"
6) "26"
7) "Uses for cURL"
8) "1352619600"
9) "6"
10) "The Nature of Ruby"
```

```
11) "1352619200"
12) "2"
```

[illegible]GET #[illegible]

4.3.5 STORE[illegible]

[illegible]SORT[illegible]STORE[illegible]sort.result[illegible]

```
redis> SORT tag:ruby:posts BY post:*->time DESC GET post:*->title GET post:*->time GET # STORE sort.result
(integer) 12
redis> LRANGE sort.result 0 -1
1) "Windows 8 app designs"
2) "1352620100"
3) "12"
4) "RethinkDB - An open-source distributed database built with love"
5) "1352620000"
6) "26"
7) "Uses for cURL"
8) "1352619600"
9) "6"
10) "The Nature of Ruby"
11) "1352619200"
12) "2"
```

[illegible]STORE[illegible]SORT[illegible]

STORE□□□□□□□EXPIRE□□□□□□□□□□□□□□□□□

```
# □□□□□□□□□□□□□□□
$isCacheExists = EXISTS cache.sort
if $isCacheExists is 1
   # □□□□□□□□□□
   return LRANGE cache.sort, 0, -1
else
   # □□□□□□□□□□ SORT□□□□□□□□□□□ cache.sort□□□□□□
   $sortResult = SORT some.list STORE cache.sort
   # □□□□□□□□□□ 10□□
   EXPIRE cache.sort, 600
   # □□□□□□
   return $sortResult
```

4.3.6 □□□□

SORT□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□SORT□□□□□□□□□O(n+mlog(m))□□□n□□□□□□□□□□□□□□□□□□□□□□□□m□□□□□□□□□□□□□n□□□□□SORT□□□□□□□□□□□□Redis□□□□□□□□□□□□n[4]□□□

□□□□□□□SORT□□□□□□□□□□□□□

□1□□□□□□□□□□□□□□□□□□□□N□□□□□□□

□2□□□LIMIT□□□□□□□□□□□□□M□□□□□□□

□3□□□□□□□□□□□□□□□□□□□□□STORE□□□□□□□□□

4.4 □□□□

[illegible]“[illegible]RSS[illegible]”

[illegible]“[illegible]RSS[illegible]”

[illegible] Redis [illegible]

[illegible]

[illegible]2[illegible]10[illegible]“[illegible]”[illegible]

[illegible]

4.4.1 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]producer[illegible]consumer[illegible]

[illegible]

[illegible]

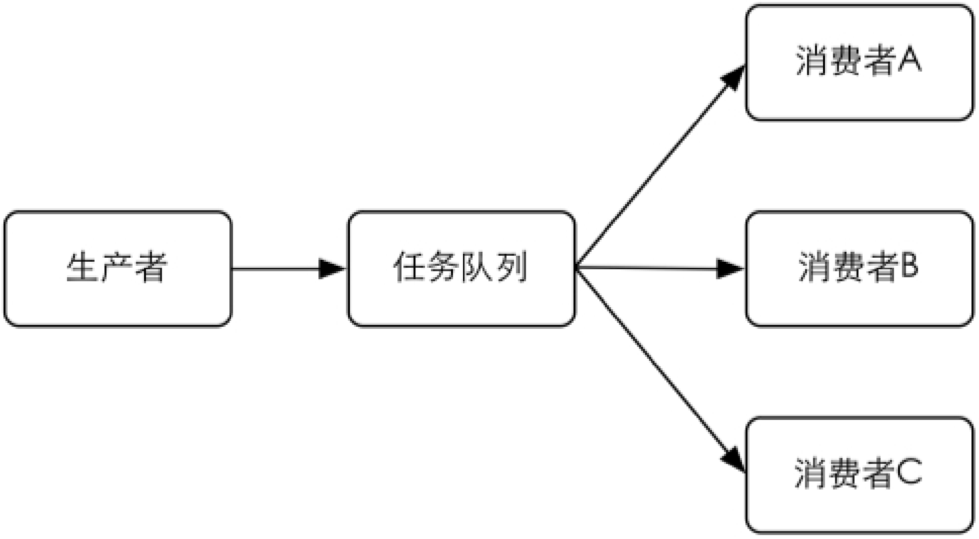
[illegible]

1[illegible]

[illegible]

2[illegible]

[illegible]4-1[illegible]



[illegible]4-1 [illegible]

4.4.2 [illegible]Redis[illegible]

[illegible]Redis[illegible]3.4.2[illegible]LPUSH[illegible]RPOP[illegible]LPUSH[illegible]RPOP[illegible]

[illegible]3[illegible]

```
# [illegible]
loop
```

```
$task = RPOR queue
if $task
  # □□□□□□□□□□□□□□
  execute($task)
else
  # □□□□□□□ 1 □□□□□□□□□□□□
  wait 1 second
```

□□□□□□ Redis □□ RPOP □□□ BRPOP □□□□□□□□□□□□□□

BRPOP□□□RPOP□□□□□□□□□□□□□□□□□□□□□□BRPOP□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
loop
# □□□□□□□□□□□□□□BRPOP □□□□□□□□□□□□□ execute()□
$task = BRPOP queue, 0
# □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
execute($task[1])
```

BRPOP□□ nil□□□□□□□□□"0"□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□ BRPOP □□□□□□□□□□□□□□□□□□□□□□□□ BRPOP□□□□□□□□□□□redis-cli□□□□□□A□□

```
redis A> BRPOP queue 0
```

□□□□□□□1□□□□□□□□□□□□□□B□□queue□□□□□□□□

```
redis B> LPUSH queue task
(integer) 1
```

□LPUSH□□□□□□□A□□□□□□□□□

```
1) "queue"
2) "task"
```

[illegible]queue[illegible]

```
redis> LLEN queue
(integer) 0
```

[illegible] BRPOP[illegible]Redis [illegible] BLPOP[illegible] BRPOP[illegible]BLPOP[illegible]LPOP[illegible]

4.4.3 [illegible]

[illegible]1000[illegible]1000[illegible]10[illegible]1000[illegible]3[illegible]1000[illegible]3[illegible]

[illegible]

BRPOP [illegible] BLPOP key [key …] timeout[illegible] BLPOP queue:1 queue:2 0[illegible] redis-cli [illegible]A[illegible]

```
redis A> BLPOP queue:1 queue:2 queue:3 0
```

[illegible]B[illegible]

```
redis B> LPUSH queue:2 task
(integer) 1
```

[illegible]A[illegible]

```
1) "queue:2"
2) "task"
```

[illegible]queue:2[illegible]queue:3[illegible]

```
redis> LPUSH queue:2 task1
1) (integer) 1
redis> LPUSH queue:3 task2
2) (integer) 1
```

[illegible]BRPOP[illegible]

```
redis> BRPOP queue:1 queue:2 queue:3 0
1) "queue:2"
2) "task1"
```

[illegible] queue:confirmation. email [illegible]queue:notification.email[illegible]

```
loop
$task =
   BRPOP queue:confirmation.email,
      queue:notification.email,
      0
execute($task[1])
```

[illegible] queue:confirmation.email [illegible] queue: notification.email[illegible]

4.4.4 “[illegible]/[illegible]”[illegible]

[illegible]Redis [illegible]“[illegible]/[illegible]”[illegible]publish/subscribe[illegible]“[illegible]/[illegible]”[illegible]

“[illegible]/[illegible]”[illegible]channel[illegible]

[illegible] PUBLISH[illegible] PUBLISH channel message[illegible]channel.1[illegible]“hi”[illegible]

```
redis> PUBLISH channel.1 hi
(integer) 0
```

[illegible]PUBLISH [illegible]channel.1[illegible]0[illegible]channel.1[illegible]

[illegible] SUBSCRIBE[illegible] SUBSCRIBE channel [channel …][illegible]redis-cli [illegible] A[illegible] channel.1[illegible]

```
redis A> SUBSCRIBE channel.1
Reading messages... (press Ctrl-C to quit)
1) "subscribe"
2) "channel.1"
3) (integer) 1
```

[illegible] SUBSCRIBE [illegible]SUBSCRIBE[illegible]UNSUBSCRIBE[illegible]PSUBSCRIBE[illegible]PUNSUBSCRIBE[illegible]4[illegible]“[illegible]/[illegible]”[illegible]3[illegible]

[illegible]3[illegible] 3 [illegible]3[illegible]

[illegible]1[illegible]subscribe[illegible]

[illegible]2[illegible]message[illegible]

□3□unsubscribe□□0□□□□□□□□□□□□□□□□□□□□□□“□□/□□”□□□□□□□

□□□□□□A□□□channel.1□□□□□□□□□□□□subscribe□□□□□□□□□□□□□□□redis-cli□□B□□□channel.1□□□□□□□

```
redis B> PUBLISH channel.1 hi!
(integer) 1
```

□□□□1□□□□□□□□□□□channel.1□□□□□A□□□□□□message□□□□

```
1) "message"
2) "channel.1"
3) "hi!"
```

□□ UNSUBSCRIBE □□□□□□□□□□□□□□□□□ UNSUBSCRIBE [channel [channel …]]□□□□□□□□□□□□□□□□□□[5]□

4.4.5 □□□□□□

□□□□□□SUBSCRIBE□□□□□□□□□□□□□□□□□□PSUBSCRIBE□□□□□□□□□□□□□□glob□□□□□□□□□3.1□□□□□□□□□□□□redis-cli□□C□□□□□

```
redis C> PSUBSCRIBE channel.?*
Reading messages... (press Ctrl-C to quit)
1) "psubscribe"
2) "channel.?*"
3) (integer) 1
```

□□channel.?*□□□□channel.1□channel.10□□□□□□channel.□□□□□□B□□□□□□

```
redis B> PUBLISH channel.1 hi!
(integer) 2
```

□□□□□2□□□□□A□□□C□□□□□□□□□channel.1□□□□□C□□□□□□□□

1) "pmessage"

2) "channel.?*"

3) "channel.1"

4) "hi!"

□□□□□□□□□□□□□PSUBSCRIBE□□

□□ □□PSUBSCRIBE□□□□□□□□□□□□□□□□□□□□□PSUBSCRIBE channel.? channel.?*□□□□ channel.2 □□□□□□□□□□□□□□□□□□□□PUBLISH□□□□□□□□2□□□1□□□□□□□□□□□□□□□□□ SUBSCRIBE channel.10□PSUBSCRIBE channel.?*□□□□channel.10□□□□□□□□□□□□□□□□□□□□□□□□□message□pmessage□□□□PUBLISH□□□□□2□

PUNSUBSCRIBE □□□□□□□□□□□□□□□ PUNSUBSCRIBE [pattern [pattern ...]]□□□□□□□□□□□□□□□□

□□ □□PUNSUBSCRIBE□□□□□□□□ PSUBSCRIBE□□□□□□□□□□□□□□□□ SUBSCRIBE □□□□□□□□□□ UNSUBSCRIBE □□□□□□□□□PSUBSCRIBE□□□□□□□□□□□□□□□□□□□□PUNSUBSCRIBE□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□PUNSUBSCRIBE *□□□□channel.*□□□□□□□□□ PUNSUBSCRIBE channel.*□□□□□

4.5 □□

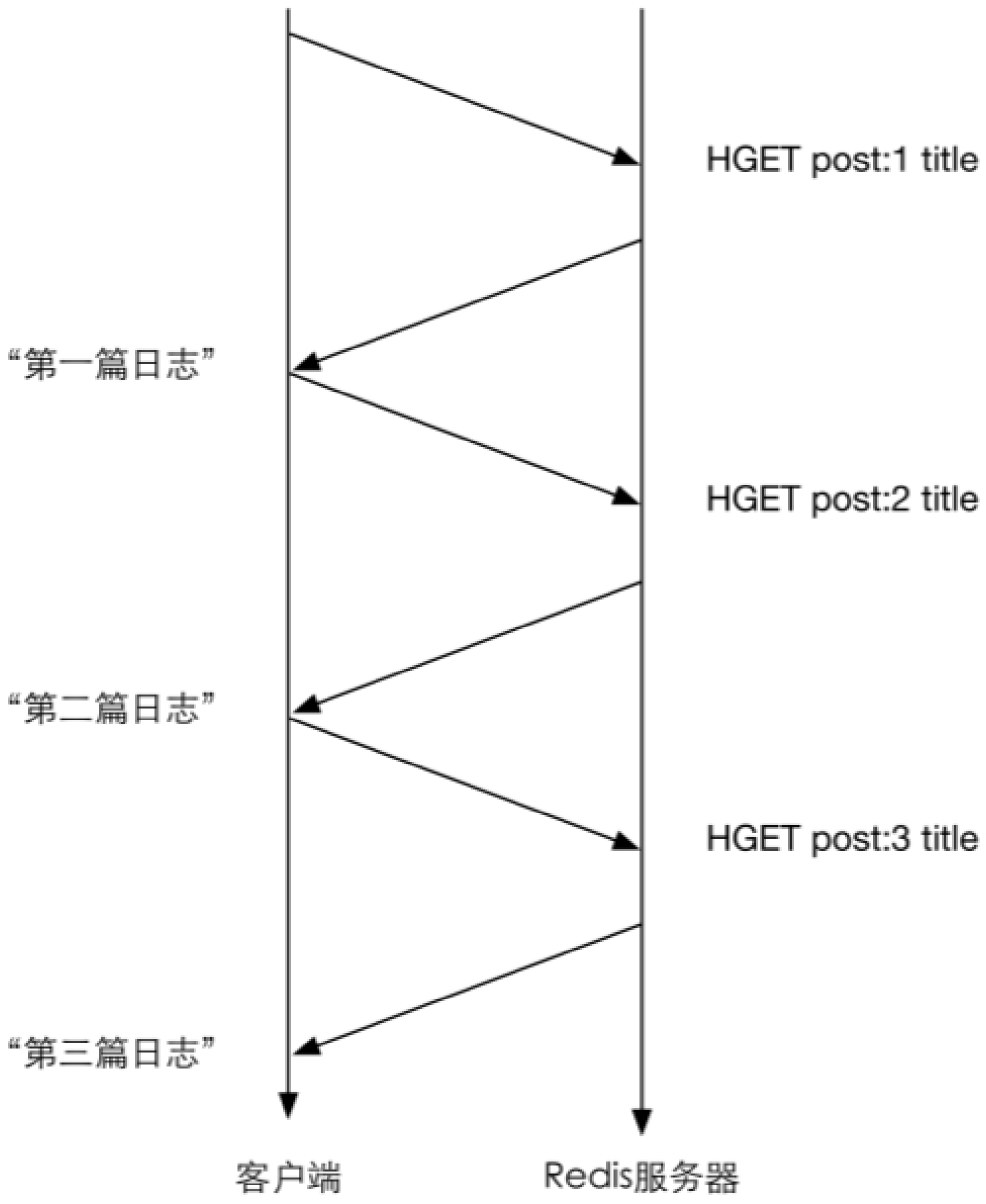
□□□□Redis□□TCP□□□□□□□□□□□□Redis□□□□□□Redis□□loop back address□□□□□□□□□□□□□ Redis □□□□□

[illegible] LPUSH list 1 2 3[illegible]

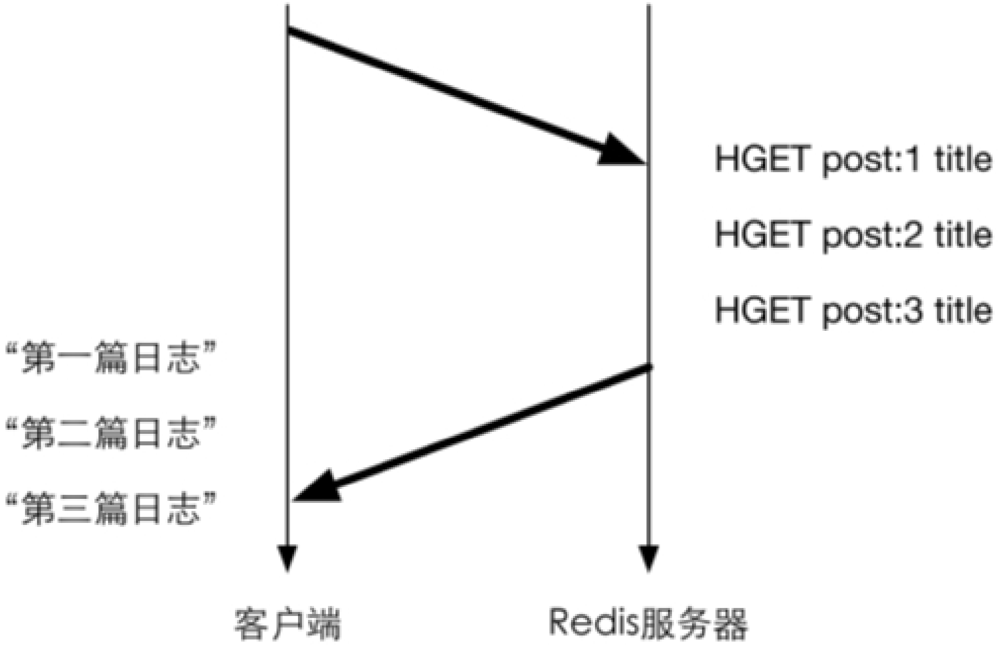
[illegible]Redis[illegible]post:1[illegible]post:2[illegible]post:3[illegible]3[illegible]title[illegible]3[illegible]4-2[illegible]

Redis [illegible]pipelining[illegible] Redis [illegible]4-3[illegible]

[illegible]5[illegible]


HGET post:1 title
“第一篇日志”
HGET post:2 title
“第二篇日志”
HGET post:3 title
“第三篇日志”
客户端
Redis服务器

[illegible]4-2 [illegible]



[illegible]4-3 [illegible]

4.6 [illegible]

Jim Gray [6] [illegible]“[illegible]”[illegible]2012[illegible]240GB[illegible]EC2[illegible] Redis [illegible]

4.6.1 [illegible]

[illegible]very.important.person:20[illegible]VIP:20[illegible]VIP:20[illegible]V:20[illegible]

[illegible]male[illegible]female[illegible]m[illegible]f[illegible]0[illegible]1[illegible][7][illegible]

4.6.2 [illegible]

[illegible] Redis[illegible]Redis[illegible]O(1)[illegible]O(1)[illegible]O(n)[illegible]Redis[illegible]O(n)[illegible]Redis[illegible]Redis[illegible]OBJECT ENCODING [illegible]

```
redis> SET foo bar
OK
redis> OBJECT ENCODING foo
"raw"
```

Redis[illegible]redisObject[illegible]redisObject[illegible]

```
typedef struct redisObject {
    unsigned type:4;
    unsigned notused:2;   /* Not used */
    unsigned encoding:4;
    unsigned lru:22;      /* lru time (relative to
server.lruclock) */
    int refcount;
    void *ptr;
} robj;
```

[illegible]type[illegible]

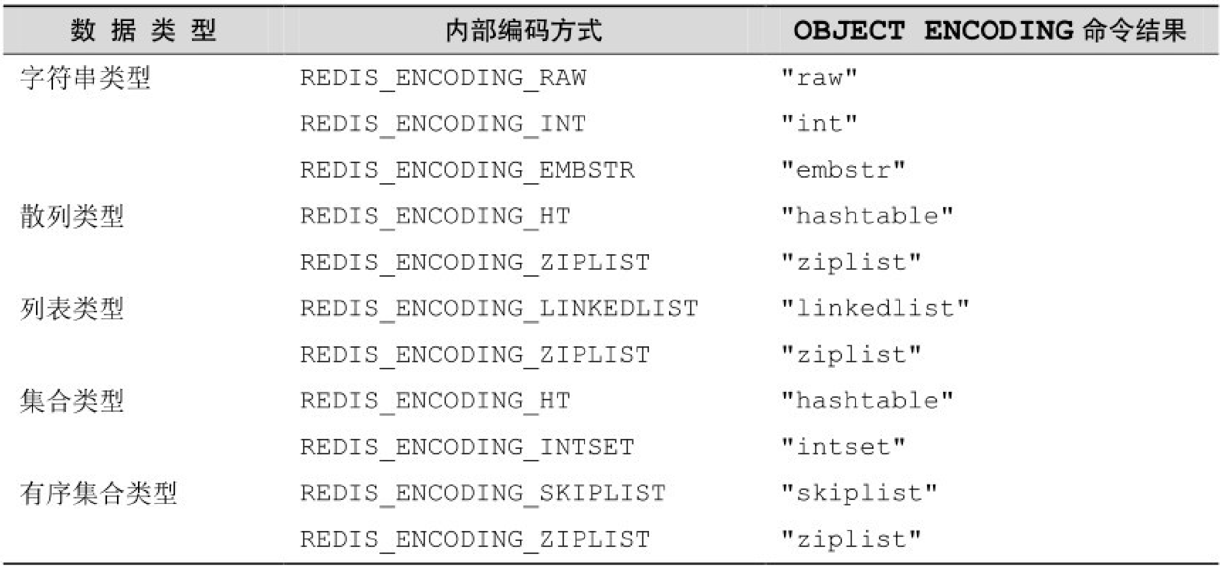
```
#define REDIS_STRING 0
#define REDIS_LIST 1
#define REDIS_SET 2
#define REDIS_ZSET 3
#define REDIS_HASH 4
```

encoding[illegible]Redis[illegible]

```
#define REDIS_ENCODING_RAW 0   /* Raw representation */
#define REDIS_ENCODING_INT 1   /* Encoded as integer */
#define REDIS_ENCODING_HT 2   /* Encoded as hash table */
#define REDIS_ENCODING_ZIPMAP 3 /* Encoded as zipmap */
#define REDIS_ENCODING_LINKEDLIST 4 /* Encoded as regular linked list */
#define REDIS_ENCODING_ZIPLIST 5 /* Encoded as ziplist */
#define REDIS_ENCODING_INTSET 6 /* Encoded as intset */
#define REDIS_ENCODING_SKIPLIST 7 /* Encoded as skiplist */
#define REDIS_ENCODING_EMBSTR 8 /* Embedded sds string encoding */
```

[illegible] OBJECT ENCODING [illegible] 4-2[illegible]

[illegible]4-2 [illegible]



数 据 类 型	内部编码方式	OBJECT ENCODING 命令结果
字符串类型	REDIS_ENCODING_RAW	"raw"
	REDIS_ENCODING_INT	"int"
	REDIS_ENCODING_EMBSTR	"embstr"
散列类型	REDIS_ENCODING_HT	"hashtable"
	REDIS_ENCODING_ZIPLIST	"ziplist"
列表类型	REDIS_ENCODING_LINKEDLIST	"linkedlist"
	REDIS_ENCODING_ZIPLIST	"ziplist"
集合类型	REDIS_ENCODING_HT	"hashtable"
	REDIS_ENCODING_INTSET	"intset"
有序集合类型	REDIS_ENCODING_SKIPLIST	"skiplist"
	REDIS_ENCODING_ZIPLIST	"ziplist"

□□□□□□□□□□□□□□□□□□□□□□□□□□□

1□□□□□□

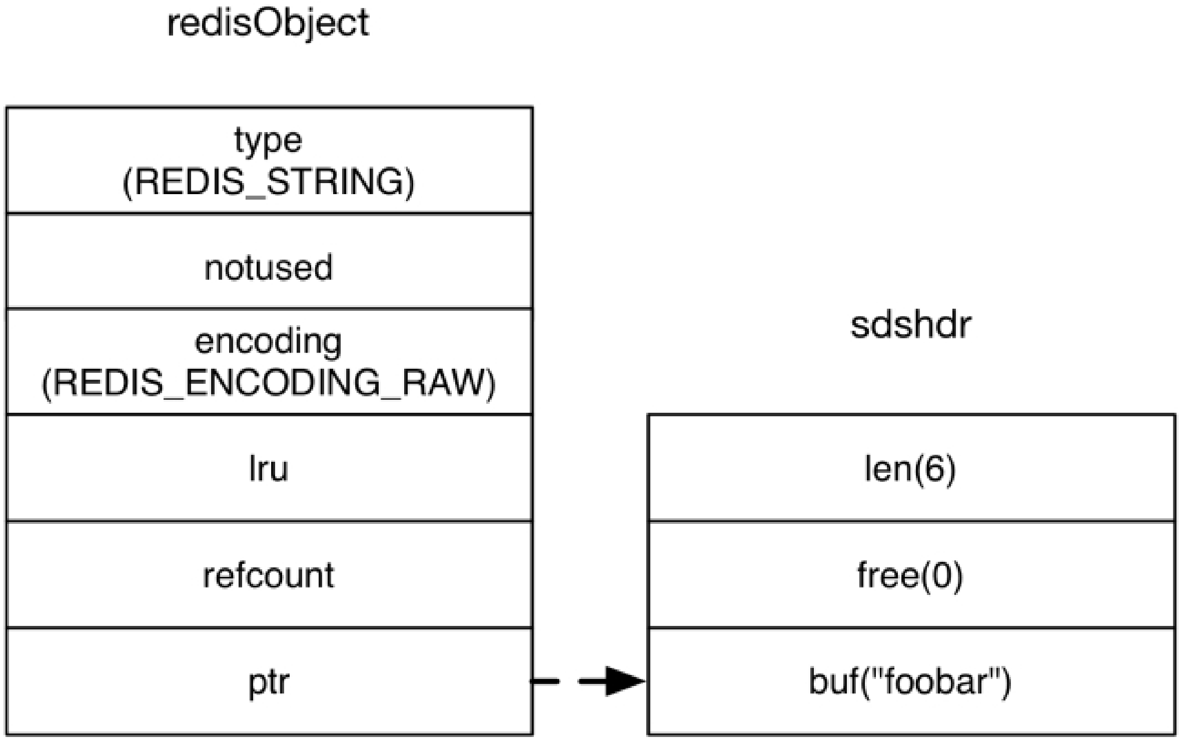
Redis□□□□sdshdr□□□□□□□□□□□□□redisObject□ptr□□□□□□□□□□□□□sdshdr□□□□□□

```
struct sdshdr {
   int len;
   int free;
   char buf[];
};
```

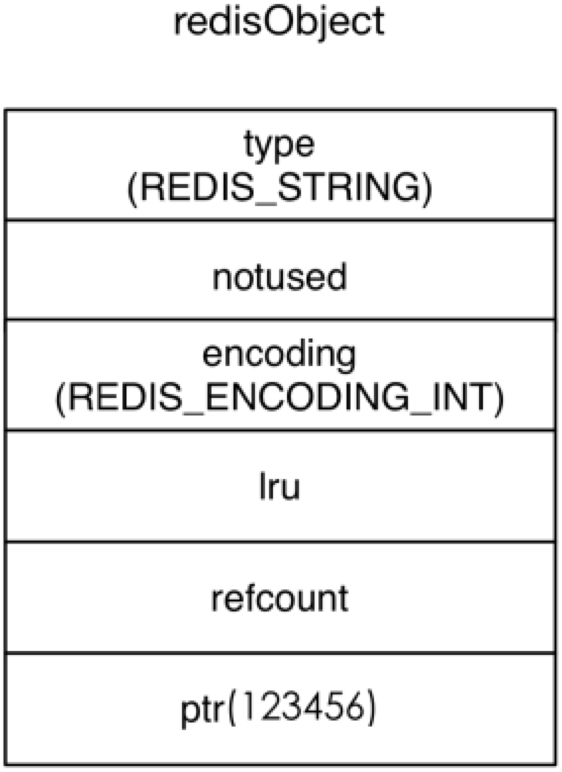
□□len□□□□□□□□□□□□□free□□□□buf□□□□□□□□buf□□□□□□□□□□□□□□

□□□□□ SET key foobar□□□□□□□□□□□□□□sizeof(redisObject) + sizeof(sdshdr) + strlen("foobar") = 30□□[8]□□□4-4□□□

□□□□□□□□□□□64□□□□□□□□□□Redis□□□□□□□long□□□□□□□SET key 123456□□□□□□□□□ sizeof(redisObject) = 16 □□□□□□"foobar"□□□□□□□□□□□□□4-5□□□



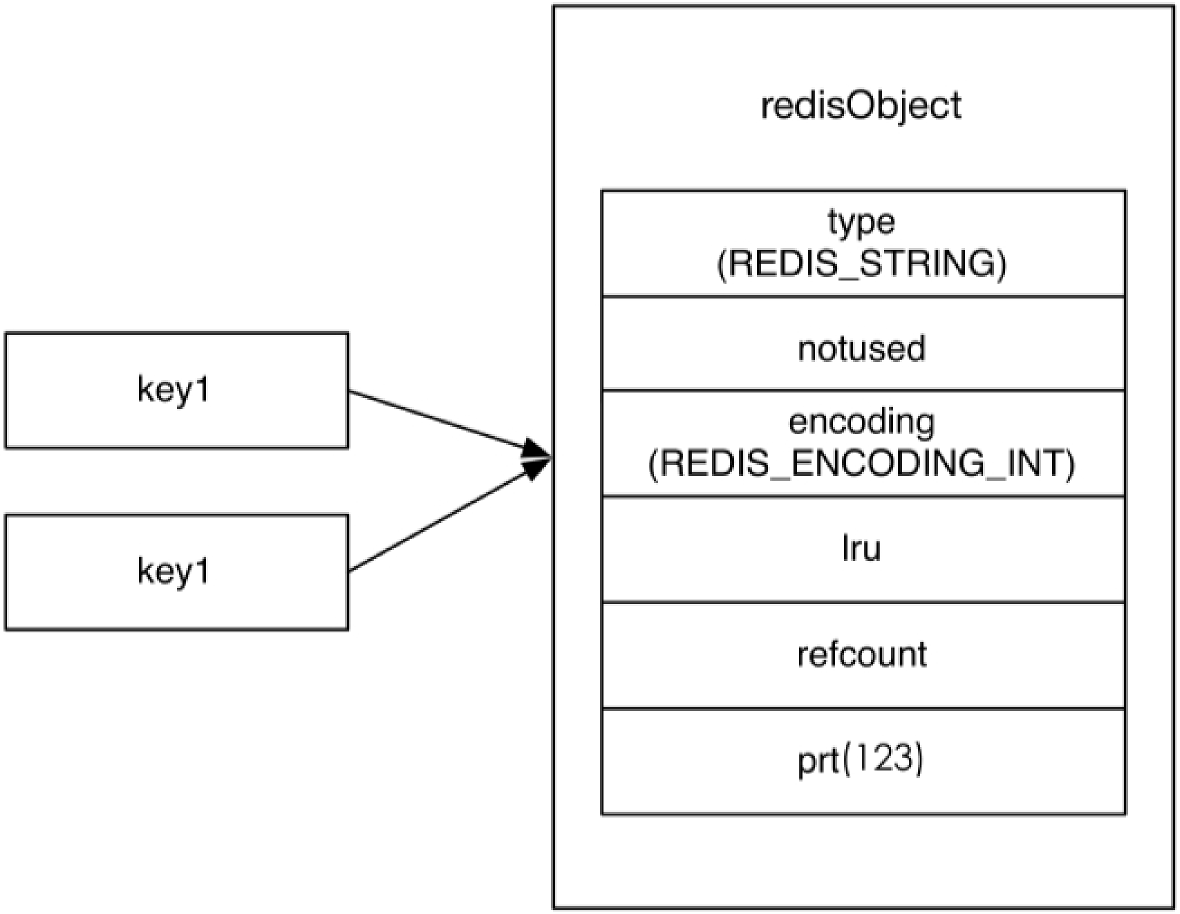
□4-4 □□□□□"foobar"□□ RAW □□□□□□□□



□4-5 □□□□□"123456"□□□□□

redisObject□□refcount□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□10000□□□□□□0□9999□□□□□redisObject□□□□□□□□□□□□□□□□□□□□□□□□10000□□□□□□ SET key1 123□□□□□□□□□□□□□□□□□□□□ redisObject □□□□□□□□□□□□□□□□0□□□□□4-6□□□

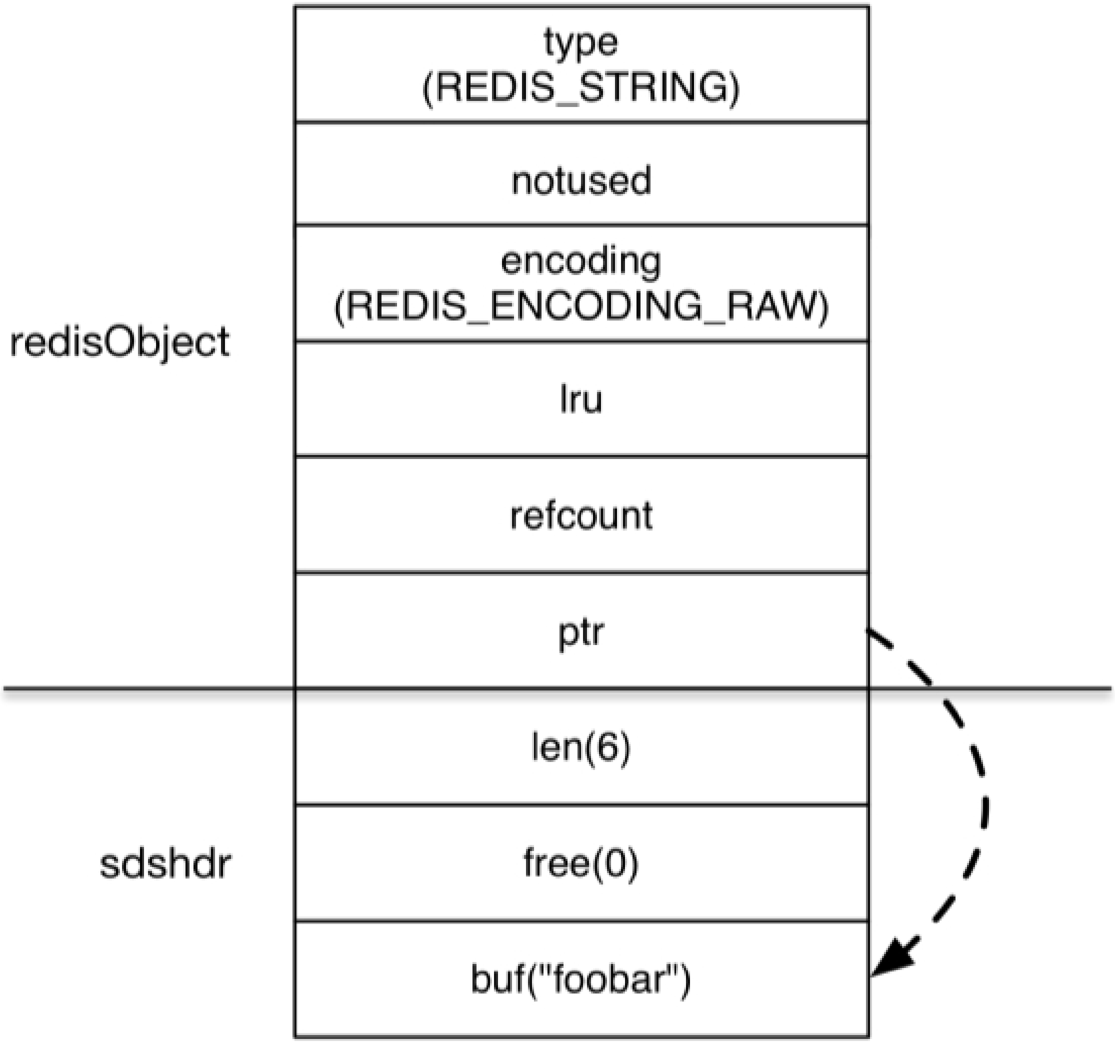
□□□□□□□□□□□□□□□□□ID□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□



□4-6 □□□□ SET key1 123 □ SET key2 123 □□key1 □ key2□□
□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□ □□□□□□□□□ maxmemory □□□ Redis □□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□ redisObject □□□□LRU□□□

□□Redis 3.0□□□□ REDIS_ENCODING_EMBSTR □□□□□□□□□□□□□□□REDIS_ENCODING_RAW□□□□□□□sdshdr□□□□□□□sdshdr□□□□□□□□□□□□□□□□□□□□□□□□□□4-7□□□



□4-7 □□□□□"foobar"□□ EMBSTR □□□□□□□□

□□REDIS_ENCODING_EMBSTR□□39□□□□Redis □□□ REDIS_ENCODING_EMBSTR□□□□□□□□□REDIS_ENCODING_EMBSTR□□□□□□□□□□□□□□□□APPEND□□□□Redis□□□□□□REDIS_ENCODING_RAW□□□

2□□□□□

[illegible] REDIS_ENCODING_HT [illegible] REDIS_ENCODING_ZIPLIST [9] [illegible] REDIS_ENCODING_ZIPLIST[illegible]

hash-max-ziplist-entries 512

hash-max-ziplist-value 64

[illegible]hash-max-ziplist-entries[illegible] hash-max-ziplist-value [illegible]Redis [illegible] REDIS_ENCODING_ZIPLIST [illegible] REDIS_ENCODING_HT[illegible]Redis[illegible]

REDIS_ENCODING_HT[illegible]O(1)[illegible] redisObject [illegible]

[illegible] Redis[illegible] REDIS_ENCODING_HT [illegible] redisObject [illegible]"123456"[illegible]"abcdef"[illegible]

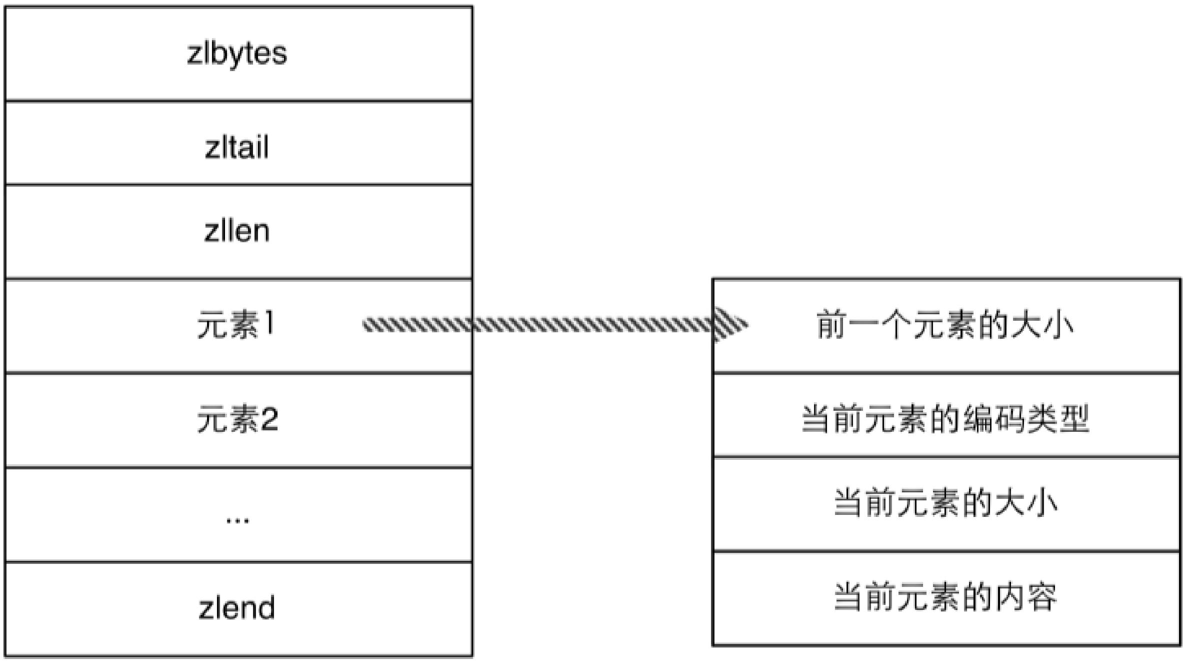
[illegible] Redis [illegible] redisDb [illegible] redisDb[illegible]

```
typedef struct redisDb {
    dict *dict;            /* The keyspace for this DB */
    dict *expires;         /* Timeout of keys with a timeout
set */
    dict *blocking_keys;      /* Keys with clients waiting for
data (BLPOP) */
    dict *ready_keys;      /* Blocked keys that received a
PUSH */
    dict *watched_keys;      /* WATCHED keys for
MULTI/EXEC CAS */
```

```
    int id;
} redisDb;
```

dict□□□□□□□□□□expires□□□□□□□□□□□□□Redis□□□□□□□□□□□databases□□□□□□□□□□□□ redisDb□□□□□□□□□□□□□□□□

REDIS_ENCODING_ZIPLIST □□REDIS_ENCODING_ZIPLIST □□□□□□ 4-8 □□□□□ zlbytes□uint32_t□□□□□□□□□□□□□□□zltail□□ uint32_t□□□□□□□□□□□□□□□□□□ zltail □□zllen□uint16_t□□□□□□□□□□□□□zlend□□□□□□□□□□□□□□□□□□□□□□255□



□4-8 REDIS_ENCODING_ZIPLIST□□□□□□□

□REDIS_ENCODING_ZIPLIST□□□□□□4□□□□□□

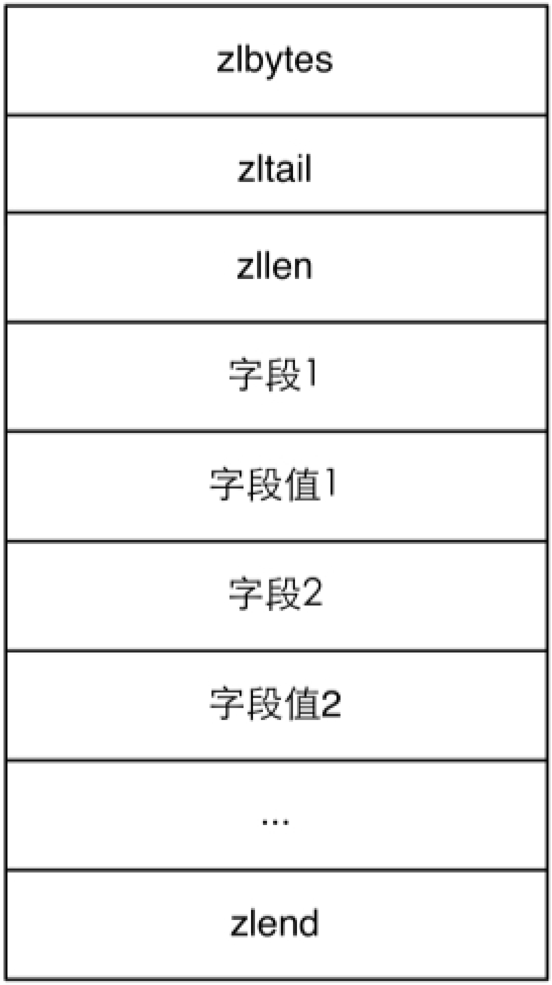
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□254□□□□□□□□□□1□□□□□□□□□5□□□□

[illegible] 63[illegible]ZIP_STR_06B[illegible]0<<6[illegible]6[illegible]1[illegible]63[illegible]16383[illegible]2[illegible]16383[illegible]5[illegible]

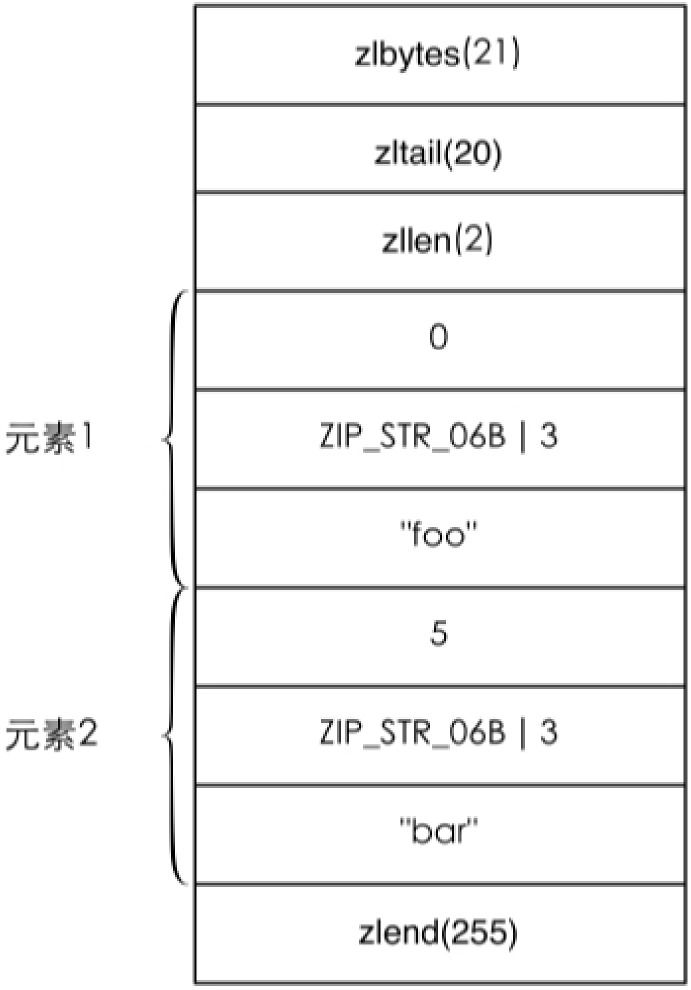
[illegible]Redis[illegible]int16_t[illegible]int32_t[illegible]

[illegible]REDIS_ENCODING_ZIPLIST[illegible]1[illegible]1[illegible]2[illegible]1[illegible]4-9[illegible]

[illegible] HSET hkey foo bar[illegible]hkey[illegible]4-10[illegible]



[illegible]4-9 [illegible] REDIS_ENCODING_ZIPLIST[illegible]



□4-10 hkey□□□□□□□

□□□□□□ HSET hkey foo anothervalue□Redis□□□□□□□□□□ foo□□□ anothervalue□□ hash-max-ziplist-entries□hash-max-ziplist-value□□□□□□□□□□

3□□□□□

□□□□□□□□□□□□□□ REDIS_ENCODING_LINKEDLIST□ REDIS ENCODING_ZIPLIST□□□□□□□□□□□□□□□ REDIS_ENCODING_ZIPLIST□□□□□□□□

list-max-ziplist-entries 512

list-max-ziplist-value 64

□□□□□□□□□□□□□□□□□□□□□

REDIS_ENCODING_LINKEDLIST□□□□□□□□□□□□□□□□□□□□redis Object □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□ REDIS_ENCODING_ZIPLIST □□□□□□□□□□□□□□□□□□□□REDIS_ENCODING_ZIPLIST □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

Redis□□□□□□□□□□ REDIS_ENCODING_QUICKLIST□□□□□□□□□□□REDIS_ENCODING_LINKEDLIST□REDIS_ENCODING_ZIPLIST □□□□□□□□□□□□□□□□□□□□□□□□□□□ ziplist□□□□□□□□□□□□□□□□REDIS_ENCODING_ZIPLIST□□□□□□□□□

4□□□□□

□□□□□□□□□□□□□□ REDIS_ENCODING_HT □REDIS_ENCODING_INTSET□□□□□□□□□□□□□□□□□□□□□□□□□□□□set-max-intset-entries□□□□□□□□□512□□Redis□□□REDIS_ENCODING_INTSET□□□□□□□□□□□□□REDIS_ENCODING_HT□□□□

REDIS_ENCODING_INTSET□□□□□□□intset□□□□□

```
typedef struct intset {
   uint32_t encoding;
   uint32_t length;
   int8_t contents[];
} intset;
```

□□contents□□□□□□□□□□□□□□□encoding□□□□□□□□□□□□□□□□□□□□□encoding□INTSET_ENC_INT16□□2□□□□□□□□□□□□□□□□□□2 □□□□□□□Redis □□□□□□ encoding □□□ INTSET_ENC_INT32□□4

□□□□□□□□□□□□□□□□□□□□□□□□□encoding□□□□□
INTSET_ENC_INT64□□8□□□□□

REDIS_ENCODING_INTSET□□□□□□□□□□□□□□□□□SMEMBERS□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□set-max-intset-entries□□□□□□□Redis□□□□□□□□□□□□□□□REDIS_ENCODING_HT□

□□ □□□□□□□□□□□ REDIS_ENCODING_HT □□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□ REDIS_ENCODING_INTSET□□□□□□□□□□□□□□□□□Redis□□□O(n)□□□□

5□□□□□□□

□□□□□□□□□□□□□□□□ REDIS_ENCODING_SKIPLIST □
REDIS_ENCODING_ZIPLIST□□□□□□□□□□□□□□□
REDIS_ENCODING_ZIPLIST□□□□□□□□

zset-max-ziplist-entries 128

zset-max-ziplist-value 64

□□□□□□□□□□□□□□□□□□□□□□

□□□□□□REDIS_ENCODING_SKIPLIST□□Redis□□□□□□□□□□□skip list□□O(1)□□□□□□ ZSCORE □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□

□□□□□□□□□□□□□□□□ redisObject □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□double□□□□□□

□□REDIS_ENCODING_ZIPLIST□□□□□□□□□□□□□□“□□1□□□□1□□□□□□2□□□□□2□□□”□□□□□□□□□□□□□□□

[illegible]

[1]. [illegible]

[2]. [illegible]Redis [illegible] 3 [illegible]3[illegible]“3”[illegible]Redis[illegible]maxmemory-samples[illegible]

[3]. [illegible]ID[illegible]Redis [illegible]4.6[illegible]

[4]. [illegible]m[illegible]n[illegible]

[5]. [illegible]redis-cli [illegible] UNSUBSCRIBE [illegible]

[6]. Jim Gray[illegible]1998[illegible]2007 [illegible]

[7]. 3.2.4 [illegible]

[8]. [illegible]64 [illegible]Linux[illegible]

[9]. [illegible]Redis 2.4 [illegible] REDIS_ENCODING_HT[illegible] REDIS_ENCODING_ZIPMAP [illegible]

□5□ □□

□□□ Redis □□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□ Redis □□□□□□□ redis-cli □□□□□□□□□□□□□□□□□□Redis□□□□□□□4□□□□□□□Redis□PHP□Python□Ruby□Node.js □□□

5.1 PHP□Redis

Redis□□□□□PHP□□□□Predis[1]□phpredis[2]□□□□□□□□PHP□□□□□□□□□□□□□□□□□C□□□□□PHP□□PHP□□□□□□□□□□Predis□□□□□□□□PHP□□□Redis□

□□Predis□□□□□phpredis□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis □□

Predis□PHP□□□□□□□□5.3□

5.1.1 □□

□□ Predis □□□□□□□□□git clone git://github.com/nrk/predis.git□□□□□□□□GitHub□□□□□□□□□□ZIP□□□□□□□□□□v1.0.1□□□□□□

https://github.com/nrk/predis/archive/v1.0.1.zip□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□autoload.php□□□□□□□□□□□ predis □□□□□□□□□□□□□□

```
require './predis/autoload.php';
```

Predis □□□PHP 5.3 □□□□□□□□□□□□PSR-0 □□[3]□autoload.php □□□□□□PHP□□□□□□□□□□□□□□□□□□□autoload.php□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
$redis = new Predis\Client();
```

□□□□□Predis□□□□Client.php□□□□□□□□□□□□PHP□□□□□□□□□□□□□□□□□□□□autoload.php□□

5.1.2 □□□□

□□□□□□□Redis□□□□

```
$redis = new Predis\Client();
```

□□□□□□□Redis□□□□127.0.0.1□□□□6379□□□□□□□□□□□□□□□□□□

```
$redis = new Predis\Client(array(
   'scheme' => 'tcp',
   'host' => '127.0.0.1',
   'port' => 6379,
));
```

□□□□□□□□□□□get□□□□□□□

```
echo $redis->get('foo');
```

□□□□□□□□□□ foo □□□□□□□□□□□□□□□□□□□□□□□□NULL□

□foo□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
try {
   echo $redis->get('foo');
} catch (Exception $e) {
   echo "Message: {$e->getMessage()}";
}
```

□□□□□□□□□“Message: ERR Operation against a key holding the wrong kind of value”□

□□□□□□□□□□ GET□□□□□□□□□ LPUSH numbers 1 2 3□

```
$redis->lpush('numbers', '1', '2', '3');
```

5.1.3 □□□□

□□□□□□□□□Predis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

Predis□□MSET□□□□□□PHP□□□□□□□□□□□□□□□□□

1□MGET/MSET

```
$userName = array(
   'user:1:name' => 'Tom',
   'user:2:name' => 'Jack'
);
//□□□$redis->mset('user:1:name', 'Tom', 'user:2:name', 'Jack');
$redis->mset($userName);
```

□□MGET□□□□□□□□□□□□□

```
$users = array_keys($userName);
print_r($redis->mget($users));
```

□□□□□□□

```
Array
```

```
(
   [0] => Tom
   [1] => Jack
)
```

2□HMSET/HMGET/HGETALL

Predis□□HMSET□□□□MSET□□□□□

```
$user1 = array(
   'name' => 'Tom',
   'age' => '32'
);
$redis->hmset('user:1', $user1);
```

HMGET□MGET□□□□□□□□□□□□□HGETALL□□□Predis□□Redis□□□□□□□□□□□□□□□

```
$user = $redis->hgetall('user:1');
echo $user['name']; // 'Tom'
```

3□LPUSH/SADD/ZADD

LPUSH□SADD□□□□□□□□

```
$items = array('a', 'b');
//□□□$redis->lpush('list', 'a', 'b');
$redis->lpush('list', $items);
//□□□$redis->sadd('set', 'a', 'b');
$redis->sadd('set', $items);
```

□ZADD□□□□□□□

```
$itemScore = array(
   'Tom' => '100',
   'Jack' => '89'
);
```

```
//[illegible]$redis->zadd('zset', '100', 'Tom', '89', 'Jack');
$redis->zadd('zset', $itemScore);
```

4[illegible]SORT

[illegible]Predis[illegible]SORT[illegible]SORT[illegible] SORT mylist BY weight_* LIMIT 0 10 GETvalue_* GET # ASC ALPHA STORE result[illegible]Predis[illegible]

```
$redis->sort('mylist', array(
    'by' => 'weight_*',
    'limit' => array(0, 10),
    'get' => array('value_*', '#'),
    'sort' => 'asc',
    'alpha' => true,
    'store' => 'result'
));
```

5.1.4 [illegible]

[illegible]PHP[illegible]Redis[illegible]

1[illegible]

[illegible]

[illegible]“user:[illegible]ID”[illegible]ID[illegible] ID [illegible] email.to.id [illegible]ID[illegible]ID[illegible]

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□register.php□□□
□□□□□□□□□□□□□□□□□□□□

```
//□□ Content-type □□□□□□□□□□□□□□□□□□□□□
//□□□□□□□□□□□□□□□□□□□□□ utf-8□
header("Content-type: text/html; charset=utf-8");
if(!isset($_POST['email']) ||
   !isset($_POST['password']) ||
   !isset($_POST['nickname'])) {
   echo '□□□□□□□□□';
   exit;
}
$email = $_POST['email'];
//□□□□□□□□□□□□□
if(!filter_var($email, FILTER_VALIDATE_EMAIL)) {
      echo '□□□□□□□□□□□□□';
   exit;
}
$rawPassword = $_POST['password'];
//□□□□□□□□□□□□□
if(strlen($rawPassword) < 6) {
   echo '□□□□□□□□□□□□□□ 6□';
   exit;
}
$nickname = $_POST['nickname'];
//□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
//□□□□□□□□□□□□□□□□□□□□□□
$redis = new Predis\Client();
```

```
if($redis->hexists('email.to.id', $email)) {
   echo '[illegible]';
   exit;
}
```

[illegible] Redis [illegible]

[illegible]“[illegible]”[illegible]salt[illegible] Bcrypt [illegible]PHP 5.3 [illegible] crypt[illegible]Bcrypt[illegible]crypt[illegible]

```
function bcryptHash($rawPassword, $round = 8)
{
   if ($round < 4 || $round > 31) $round = 8;
   $salt = '$2a$' . str_pad($round, 2, '0', STR_PAD_LEFT) .
 '$';
   $randomValue = openssl_random_pseudo_bytes(16);
   $salt .= substr(strtr(base64_encode($randomValue),
 '+', '.'), 0, 22);
   return crypt($rawPassword, $salt);
}
```

[illegible] openssl_random_pseudo_bytes[illegible]OpenSSL[illegible]

[illegible]

```
$hashedPassword = bcryptHash($rawPassword);
```

[illegible]3[illegible]

```
require './predis/autoload.php';
```

```
$redis = new Predis\Client();
//[illegible] ID
$userID = $redis->incr('users:count');
//[illegible]
$redis->hmset("user:{$userID}", array(
    'email'    => $email,
    'password'    => $hashedPassword,
    'nickname'    => $nickname
));
//[illegible] ID [illegible]
$redis->hset('email.to.id', $email, $userID);
//[illegible]
echo '[illegible]';
```

[illegible]

2[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]email.to.id[illegible]ID[illegible]login.php[illegible]

```
header("Content-type: text/html; charset=utf-8");
if(!isset($_POST['email']) ||
    !isset($_POST['password'])) {
    echo '[illegible]';
    exit;
}
```

```
    $email = $_POST['email'];
    $rawPassword = $_POST['password'];
    require './predis/autoload.php';
    $redis = new Predis\Client();
    //□□□□□ ID
    $userID = $redis->hget('email.to.id', $email);
    if(!$userID) {
      echo '□□□□□□□□□';
    exit;
    }
    $hashedPassword = $redis->hget("user:{$userID}",
'password');
```

□□bcryptHash□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□crypt□□□□□□□□□crypt□□□□□□□□□□□□□□

```
    function bcryptVerify($rawPassword, $storedHash)
    {
      return crypt($rawPassword, $storedHash) ==
  $storedHash;
    }
```

□□□□□□□□□□□□□□□□

```
    if(!bcryptVerify($rawPassword, $hashedPassword)) {
      echo '□□□□□□□□□';
    exit;
    }
    echo '□□□□□';
```

3□□□□□

[illegible]1[illegible]10[illegible]

[illegible]

[illegible]1[illegible]4.2.3[illegible]

```
$keyName = "rate.limiting:{$email}";
$now = time();
if($redis->llen($keyName) < 10) {
   $redis->lpush($keyName, $now);
} else {
   $time = $redis->lindex($keyName, -1);
   if($now - $time < 60) {
      echo '[illegible]';
   exit;
   } else {
      $redis->lpush($keyName, $now);
      $redis->ltrim($keyName, 0, 9);
   }
}
```

[illegible]IP[illegible]

[illegible]2[illegible]retrieve.password.code:[illegible]EXPIRE[illegible]1[illegible]Bcrypt[illegible]

5.2 Ruby□Redis

Redis□□□□□Ruby□□□□redis-rb[4]□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□Pieter Noordhuis□

5.2.1 □□

□□ gem install redis□□□□□□□redis-rb□□□□□□□□□3.2.0□

5.2.2 □□□□

□□□Redis□□□□□□□

```
require 'redis'
redis = Redis.new
```

□□□□□□□Redis□□□□127.0.0.1□□□□6379□□□□□□□□□□□□□□□□□□

```
redis = Redis.new(:host => '127.0.0.1', :port => 6379)
```

redis-rb□□□□□□□□□□□□□□□□□□□□□□□□□GitHub□□□□□□□□□□□□□□□□□□□□□□□□□□

```
r.set('redis_db', 'great k / v storage') # => OK
r.get('redis_db')                  # => "great k / v storage"
r.incrby('counter', 99)               # => 99
r.hmset('hash_dt', :key2, 'value2', :key3, 'value3') # =>
OK
```

5.2.3 □□□□

redis-rb□□□□□□□□□□□□□SET□GET□□□□□□[]□□□□

```
redis.set('key', 'value')
```

[illegible]

```
redis['key'] = 'value'
```

[illegible]

```
value = redis.get('key')
```

[illegible]

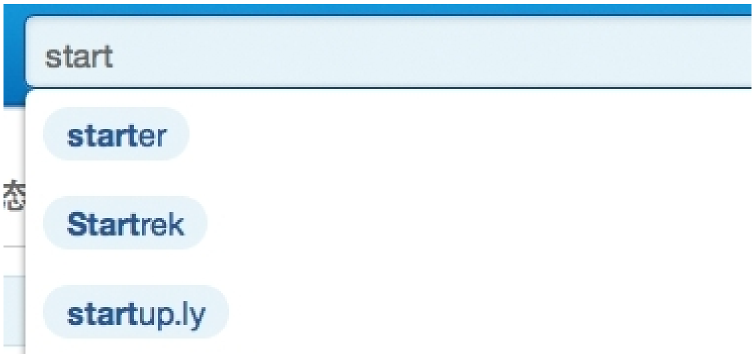
```
value = redis['key']
```

[illegible]

```
redis.multi do
   redis.set('key', 'hi')
   @value = redis.get('key')
   redis.set('key', '2')
   @number = redis.incr('key')
end
p @value.value # [illegible]"hi"
p @number.value # [illegible] 3
```

5.2.4 [illegible]

[illegible]5-1[illegible]



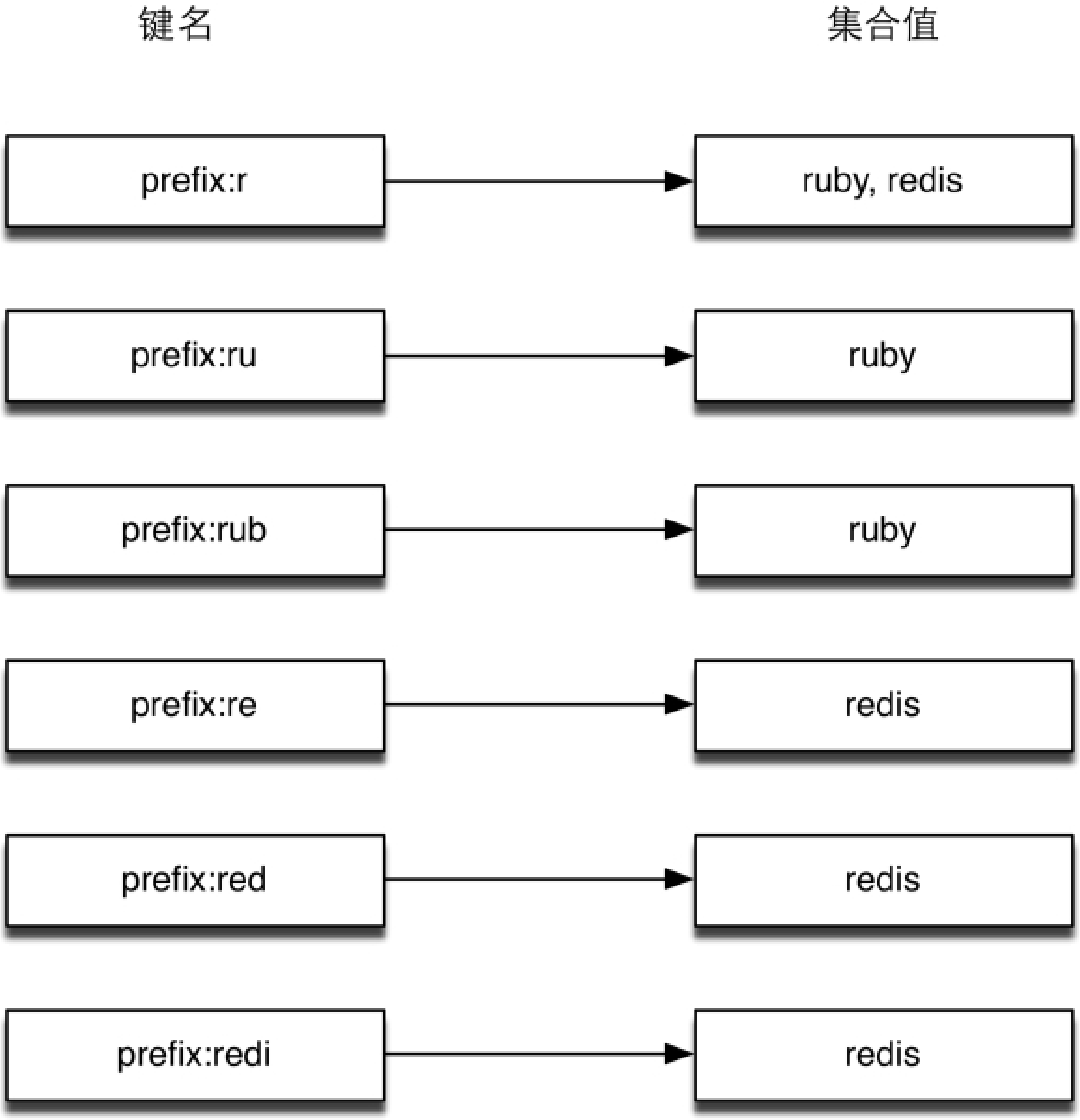
[illegible]5-1 [illegible]“start”[illegible]“start”[illegible]

□□

□□□□□□□Redis□□□□□□□□□□□□□□□□□□Ruby□□□□

□□“ruby”□□□□□□□□“r”“ru”□“rub”□□□□□3□□□□□□□□□□□□□□□□“ruby”□

□□“ruby”□“redis”□□□□□□Redis□□□□□□□□5-2□□□□□□□“r”□□□□□□□□□“prefix:r”□□□□“r”□□□□□□“ruby”□“redis”□□□



□5-2 “ruby”□“redis”□□□□□□□□□□□

[illegible]SORT[illegible]BY[illegible]

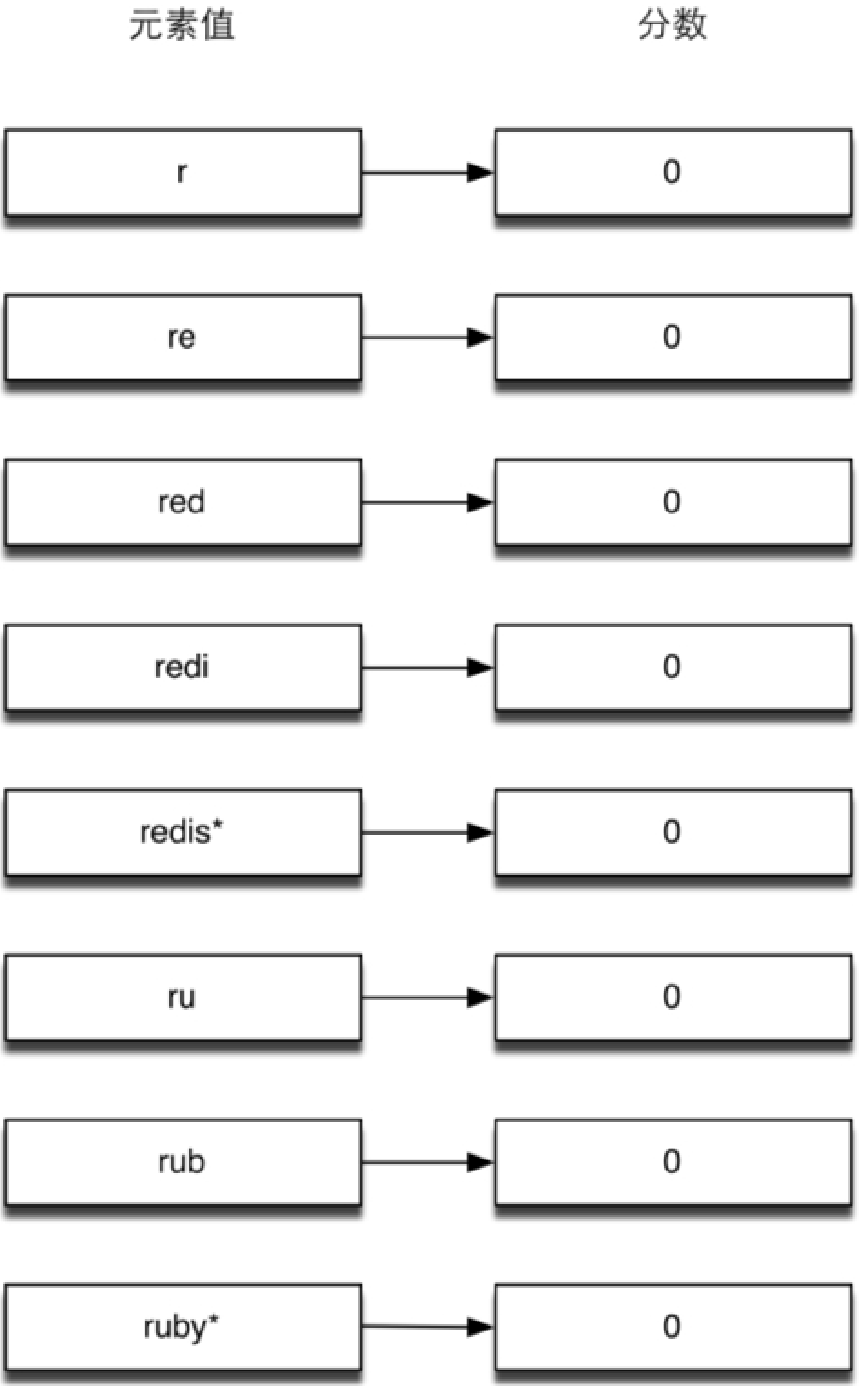
[illegible]Redis[illegible]Salvatore Sanfilippo[illegible]

3.6[illegible]

[illegible]1[illegible]0[illegible]

[illegible]2[illegible]“*”[illegible]0[illegible]

[illegible]5-3[illegible]



□5-3 “ruby”□“redis”□□□□□□□□□□□

□□ 5-3 □□□□□□□□□□□□□□“r”□□□□□□□□□□□□□□□□□□□□□□

[illegible]1[illegible]“r”[illegible]ZRANK autocomplete r[illegible]0[illegible]

[illegible]2[illegible]“r”[illegible]N[illegible]N=100 [illegible]ZRANGE autocomplete 1 101[illegible]N[illegible]

[illegible]3[illegible]"*"[illegible]“r”[illegible]“*”[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]

```
#[illegible]
#
# @example
#   get_prefixes('word')
#   # => ['w', 'wo', 'wor', 'word*']
def get_prefixes(word)
  Array.new(word.length) do |i|
    if i == word.length - 1
      "#{word}*"
    else
      word[0..i]
    end
  end
end
```

[illegible]redis-rb[illegible]Redis[illegible]

```
require 'redis'
# [illegible] Redis [illegible]
redis = Redis.new
```

[illegible]

```
redis.del('autocomplete')
```

[illegible]words.txt[illegible]

```
argv = []
File.open('words.txt').each_line do |word|
  get_prefixes(word.chomp).each do |prefix|
    argv << [0, prefix]
  end
end
redis.zadd('autocomplete', argv)
```

redis-rb [illegible] zadd [illegible] redis.zadd (key, score, member)[illegible] redis.zadd(key, [[score1,member1], [score2, member2], …])[illegible]

[illegible]

```
while prefix = gets.chomp do
  result = []
  if (rank = redis.zrank('autocomplete', prefix))
```

```
        # [illegible]
        redis.zrange('autocomplete', rank + 1, rank +
    100).each do |words|
            # [illegible] 100 [illegible]
            if words[-1] == '*' && prefix ==
      words[0..prefix.length - 1]
                # [illegible]"*"[illegible]
                result << words[0..-2]
            end
        end
      end
      # [illegible]
      puts result
    end
```

5.3 Python[illegible]Redis

Redis[illegible]Python[illegible]redis-py[5][illegible]

5.3.1 [illegible]

[illegible] pip install redis [illegible] redis-py[illegible] easy_install[illegible]easy_ install redis[illegible]

5.3.2 [illegible]

[illegible]redis-py[illegible]

```
import redis
```

□□□□□□□□□□□□□□□□□127.0.0.1□□□6379□Redis□□□

```
r = redis.StrictRedis()
```

□□□□□□□□□□□□□□□□

```
r = redis.StrictRedis(host='127.0.0.1', port=6379, db=0)
```

□□□□□□□□□□□SET□GET□□□□□□□

```
r.set('foo', 'bar') # True
r.get('foo')      # 'bar'
```

5.3.3 □□□□

1□HMSET/HGETALL

HMSET□□□□□□□□□□□□□□HGETALL□□□□□□□□□□□□□□□□□□□□

```
r.hmset('dict', {'name': 'Bob'})
people = r.hgetall('dict')
print people # {'name': 'Bob'}
```

2□□□□□□

redis-py□□□□□□□□□□

```
pipe = r.pipeline()
pipe.set('foo', 'bar')
pipe.get('foo')
result = pipe.execute()
print result # [True, 'bar']
```

□□□□□□□□□□□□□□□□□□□□□□□□□□transaction=False□

```
pipe = r.pipeline(transaction=False)
```

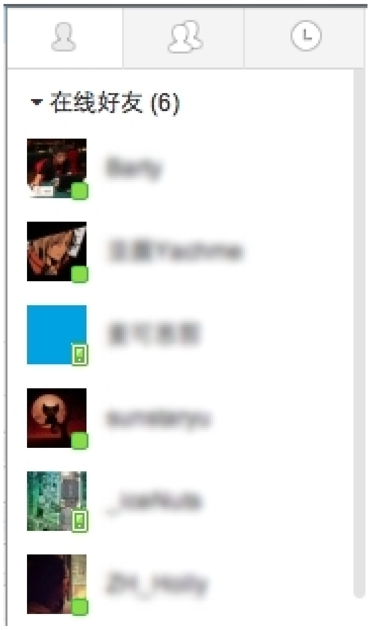
□□□□□□□□□□□□□

```
result = r.pipeline().set('foo', 'bar').get('foo').execute()
```

# [True, 'bar']

5.3.4 [illegible]

[illegible]5-4[illegible]Redis[illegible]



[illegible]5-4 [illegible]

[illegible] ID [illegible] HTTP [illegible]10[illegible]HTTP[illegible]9[illegible]11[illegible]

[illegible]Redis[illegible]10[illegible]10[illegible]ID[illegible]12[illegible]20[illegible]12[illegible]29[illegible]ID[illegible]active.users:2[illegible]12[illegible]30[illegible]12[illegible]39[illegible]ID[illegible]active.users:3[illegible]SADD[illegible] ID [illegible] 50 [illegible]29[illegible]ID[illegible]active.users:2[illegible]

[illegible]30[illegible]active.users:3[illegible]1[illegible]10[illegible]

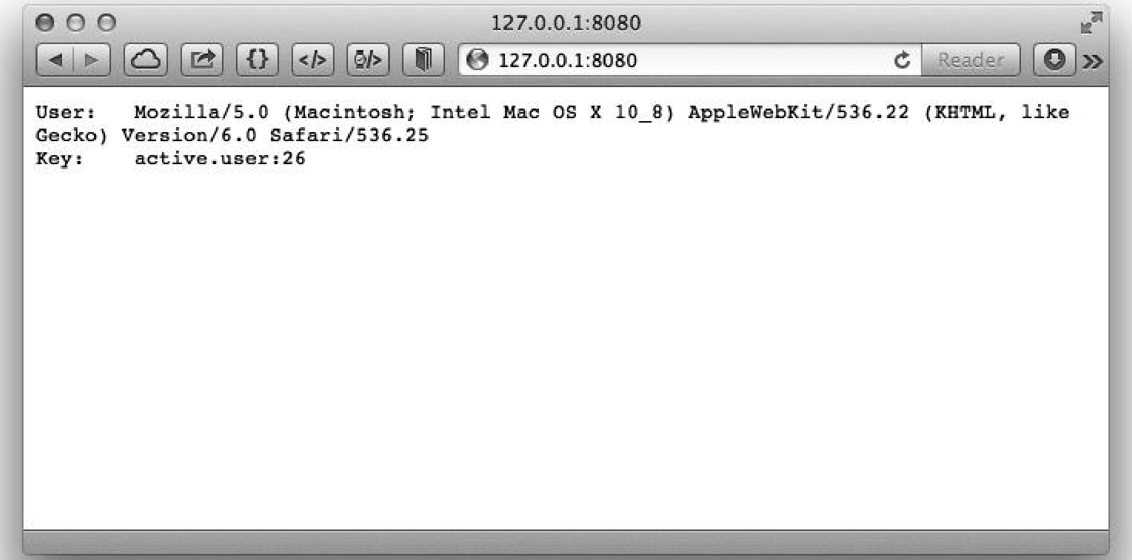
[illegible]10[illegible]1[illegible]12[illegible]29[illegible]ID[illegible]active.users:29[illegible]10[illegible]10[illegible]SUNION[illegible]

[illegible]Python[illegible]web.py[illegible]web.py[illegible]Python [illegible] sudo pip install web.py [illegible]

[illegible]

```
# -*- coding: utf-8 -*-
import web
import time
import redis
r = redis.StrictRedis()
"""[illegible]
'/':   [illegible]
'/online':[illegible]
"""
urls = (
  '/', 'visit',
  '/online', 'online'
)
app = web.application(urls, globals())
"""[illegible]
[illegible]28[illegible]active.users:28
"""
def time_to_key(current_time):
    return 'active.users:' + time.strftime('%M',
time.localtime(current_time))
"""[illegible] 10 [illegible]
[illegible]
"""
def keys_in_last_10_minutes():
    now = time.time()
    result = []
    for i in range(10):
        result.append(time_to_key(now - i * 60))
    return result
class visit:
    """ [illegible]
    [illegible] User agent [illegible] ID [illegible]
    """
    def GET(self):
        user_id = web.ctx.env['HTTP_USER_AGENT']
        current_key = time_to_key(time.time())
        pipe = r.pipeline()
        pipe.sadd(current_key, user_id)
        # [illegible] 10 [illegible]
        pipe.expire(current_key, 10 * 60)
        pipe.execute()
        return 'User:\t' + user_id + '\r\nKey:\t' + current_key
class online:
    """ [illegible]
    """
    def GET(self):
        online_users = r.sunion(keys_in_last_10_minutes())
        result = ''
        for user in online_users:
            result += 'User agent:' + user + '\r\n'
        return result
if __name__ == "__main__":
    app.run()
```

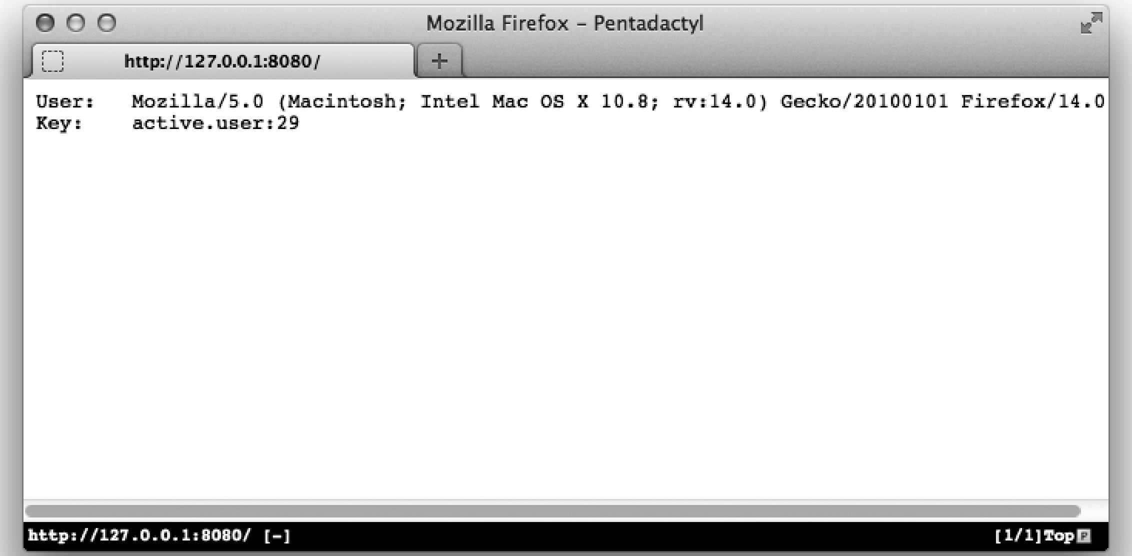
□□□□□□□□□□□□□□□□□□□□http://127.0.0.1:8080□□□□□□visit□□□□□□□□□□□□□□□□□□User agent□□□□□□□□□□□□□□□□□□□User agent□□□□□□□□□□5-5□□□



```
User:   Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8) AppleWebKit/536.22 (KHTML, like
Gecko) Version/6.0 Safari/536.25
Key:    active.user:26
```

□5-5 □□Safari □□http://127.0.0.1:8080

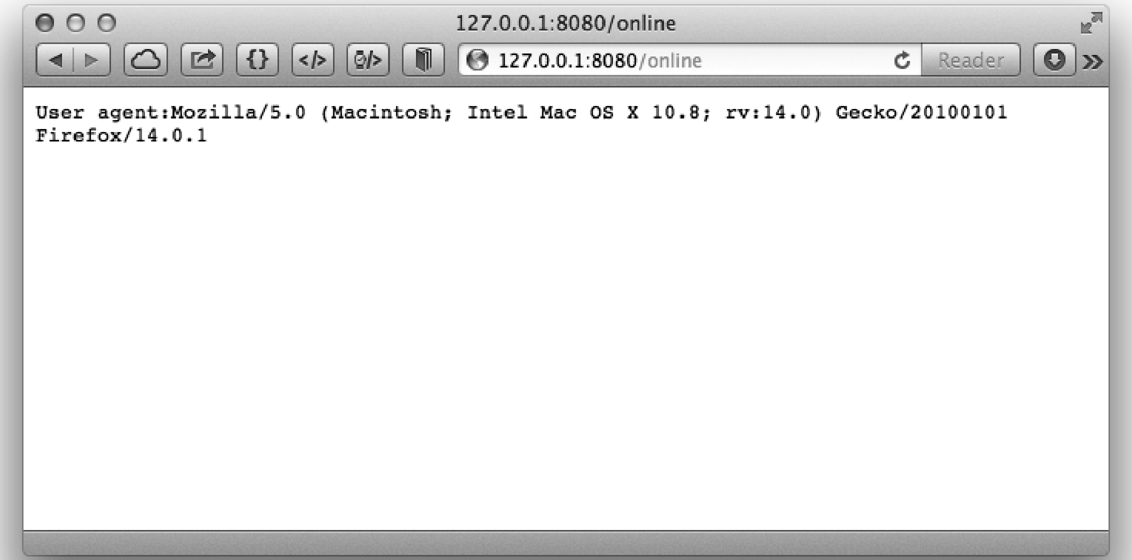
□□□□□□□□□□□□□□□26□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5-6□□□



```
User:    Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8; rv:14.0) Gecko/20100101 Firefox/14.0
Key:     active.user:29
```

□5-6 □□Firefox□□http://127.0.0.1:8080

□□□□□□□29□□□□□□□□37□□□□□http://127.0.0.1:8080/online□□□□□□□□□□□□□□5-7□□□



```
User agent:Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8; rv:14.0) Gecko/20100101
Firefox/14.0.1
```

□5-7 □□□□□□□□

□□□□□□□□□□□□□□□□29□□□□□□□□

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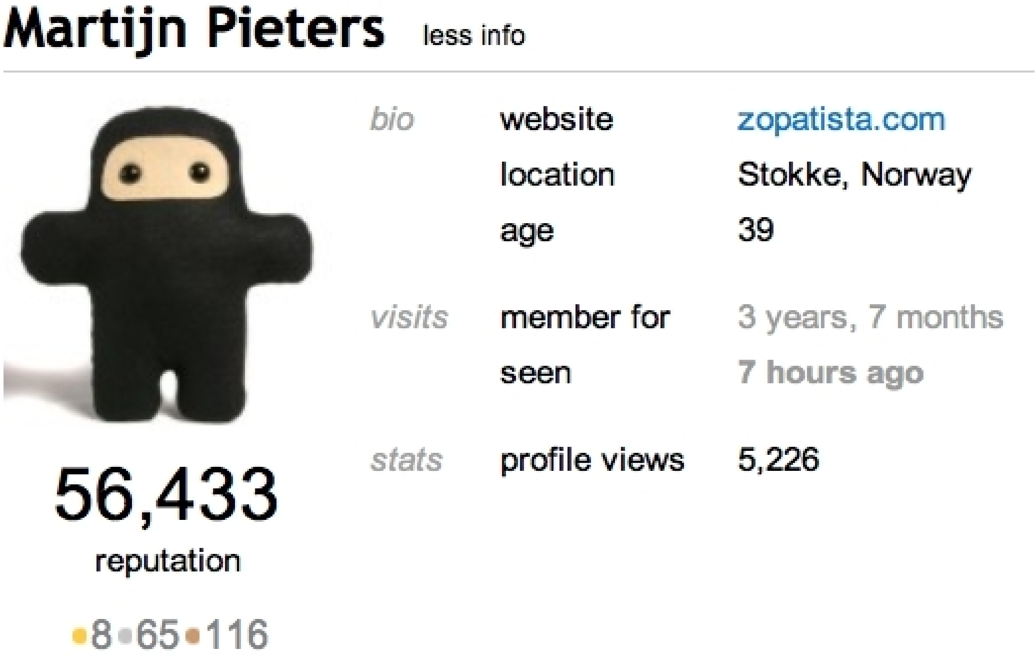
[illegible]5-8[illegible]10[illegible]



Martijn Pieters less info

bio	website	zopatista.com
	location	Stokke, Norway
	age	39
visits	member for	3 years, 7 months
	seen	7 hours ago
stats	profile views	5,226

56,433

reputation

●8 ●65 ●116

[illegible]5-8 Stack Overflow[illegible]

[illegible]ID[illegible]Unix[illegible]10[illegible]ZRANGEBYSCORE[illegible]

```
ten_minutes_ago = time.time() - 10 * 60
online_users = r.zrangebyscore('last.seen', ten_minutes_ago, '+inf')
```

[illegible]online_users[illegible]Redis[illegible] Redis [illegible] ZRANGEBYSCORE[illegible]

[illegible] ZINTERSTORE [illegible] ZUNIONSTORE [illegible]

□□□□□□□□□□□□□□□□□□□□□□ZREMRANGEBYSCORE□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□

□1□□□□□ last.seen □□□□ temp.last.seen□□□□ZUNIONSTORE temp. last.seen 1 last.seen□□□□□□□□□□□□ZUNIONSTORE □□□

□2□□□□□□□□□□ 10 □□□□□□□□□□□□□□ZREMRANGEBYSCORE temp.last.seen 0 10□□□□ Unix□□□

□3□□□temp.last.seen□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ZINTERSTORE online.friends 2 temp.last.seen user:42:friends□□□□□□ID□42□□□□□□user:42:friends□□□□□□□□□□□□[6]□

□4□□□ZRANGE□□□□online.friends□□□□

□5□□□□□□□□temp.last.seen□online.friends□□□□temp.last.seen□□

□□5□□□□□□□□□□□□□□□□□□□□□□□□

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5.4 Node.js□Redis

Redis□□□□□Node.js□Redis□□□□□□□□□node_redis[7]□ioredis[8]□□ioredis□□□□□

5.4.1 [illegible]

[illegible]npm install ioredis[illegible]ioredis[illegible]

5.4.2 [illegible]

[illegible]ioredis[illegible]

```
var Redis = require('ioredis');
```

[illegible]127.0.0.1[illegible]6379[illegible]Redis[illegible]

```
var redis = new Redis();
```

[illegible]

```
var redis = new Redis(6379, '127.0.0.1');
```

[illegible]Node.js[illegible]GET/SET[illegible]

```
redis.set('foo', 'bar', function () {
  //[illegible] SET [illegible]
  //[illegible] SET[illegible]
  redis.get('foo', function (error, fooValue) {
    //error [illegible] null[illegible]
    //[illegible]
    console.log(fooValue); // 'bar'
  });
});
```

[illegible]ioredis[illegible]callback function[illegible]ioredis[illegible]ioredis[illegible]Promise[illegible]Promise[illegible]

```
redis.get('foo').then(function (fooValue) {
    //fooValue □□□□
});
```

□□Node.js□□□□□□□□□□□□□□□□□□□□□□□□□□□Node.js□□□[9]□□□□□□□

Node.js□□□□□□□□□ioredis□□Redis□□□□□□Redis□□□□□□□□□□□□□□□□□□□□redis.set()□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□□□□Node.js□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□SET□□□□□□□□□□□SET□□□GET□□□□□□□□□□□□□□□□SET□□□□□□□□□□GET□□□□□□□□□□□□□□□□

```
//□□□□□□□□□□□□□□□
redis.set('foo', 'bar');
redis.get('foo', function (error, fooValue) {
    console.log(fooValue); // 'bar'
});
```

□□□□SET□GET□□□□□□Redis□□□□□□□□□□□□□□□□□□□□ Redis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□GET□□□□□□□□□“bar”□

□□Node.js□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□

```
redis.get('people:2:home', function (error, home) {
    redis.hget('locations', home, function (error, address) {
        redis.exists('address:' + address, function (error,
addressExists) {
            if (addressExists) {
                console.log('□□□□□');
            } else {
```

```
        redis.exists('backup.address:' + address,
    function (error, backupAddress Exists) {
          if (backupAddressExists) {
            console.log('□□□□□□□');
          } else {
            console.log('□□□□□□');
          }
        });
      }
    });
  });
});
```

□□□ Async[10]□Step[11]□□□□□□□□□□□□□□□□□□□□□□Async□□□□

```
async.waterfall([
  function (callback) {
    redis.get('people:2:home', callback);
  },
  function (home, callback) {
    redis.hget('locations', home, callback);
  },
  function (address, callback) {
    async.parallel([
      function (callback) {
        redis.exists('address:' + address, callback);
      },
      function (callback) {
        redis.exists('backup.address:' + address, callback);
      },
    ], function (err, results) {
      if (results[0]) {
        console.log('□□□□□');
      } else if (results[1]) {
        console.log('□□□□□□□');
      } else {
        console.log('□□□□□□');
      }
    });
  }
]);
```

□□□□□□□co[12]□□□□ES6□Generator□□□□ioredis□□□□□“□□□”□

```
var co = require('co');
co(function* () {
  var result = yield redis.get('foo');
  return result;
}).then(function (fooValue) {
  console.log(fooValue);
});
```

5.4.3 □□□□

1□HMSET/HGETALL

ioredis□□□□□HMSET□□□□□□□□□□□□□□□□□□□□□□□□□□□□HGETALL□□□□□□□□□□

2□□□

□□□□□□□□

```
var multi = redis.multi();
multi.set('foo', 'bar');
multi.sadd('set', 'a');
mulit.exec(function (err, replies) {
   //replies □□□□□□□□□□□□□□□□□□□□
   console.log(replies);
});
```

□□□□□□□□□

```
redis.multi()
   .set('foo', 'bar')
   .sadd('set', 'a')
   .exec(function (err, replies) {
      console.log(replies);
   });
```

3□“□□/□□”□□

Node.js □□□□□□□□□“□□/□□”□□□□□□□□□□□□□□□□□□□□□□□

```
var pub = new Redis();
var sub = new Redis();
```

□□□sub□□chat□□□□□□□□□□□□□□□□

```
sub.subscribe('chat', function () {
   pub.publish('chat', 'hi!');
});
```

□□□□□□□□□□□□□□□□□□

```
sub.on('message', function (channel, message) {
   console.log('□□' + channel + '□□□□□□' + message);
});
```

□□□□□□□□□□□□□

```
$ node testpubsub.js
□□chat□□□□□□'hi!'
```

□□□□ □ ioredis □□□□□□□□□□□□□□□□ redis = new Redis()□□ioredis□□□□□□□□□□□□□□□□□□□□□□

5.4.4 □□□IP□□□□

□□□□□□□□□□□□□□□IP□□□□□□□□□□□□□□□□□□□□IP□□□□□□□[13]□

□□: 202.127.0.0 ~ 202.127.4.255

□□: 122.200.64.0 ~ 122.207.255.255

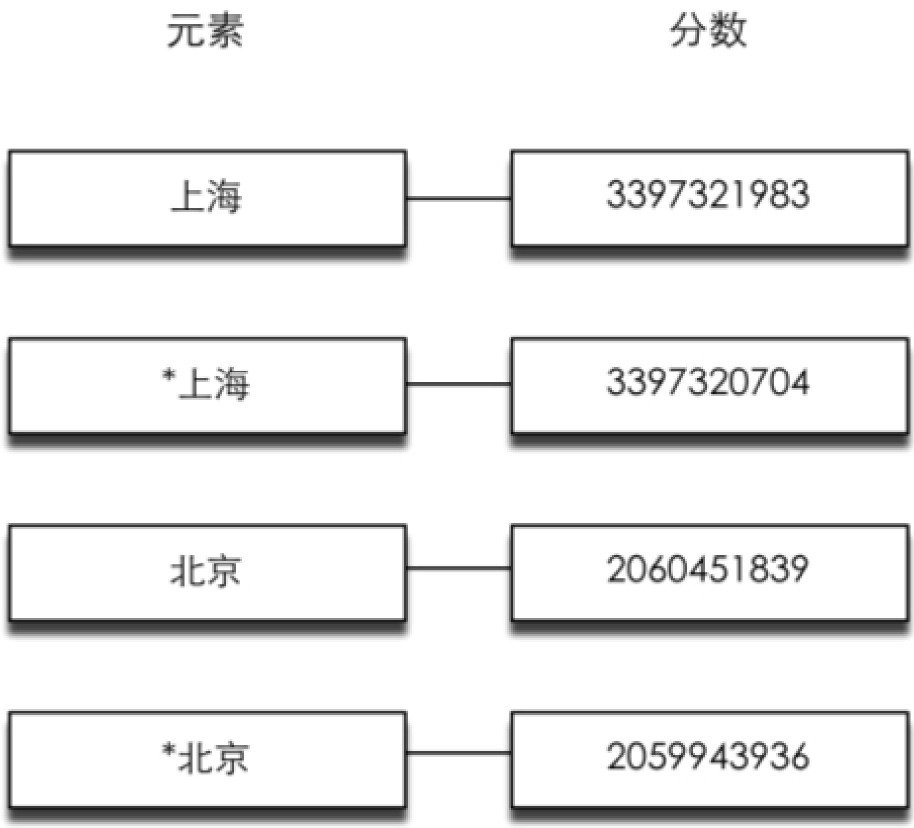
□□□□□IP□□□122.202.2.0□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□

□□□□□□IP□□□□□□□□□□□

□□: 3397320704 ~ 3397321983

□□: 2059943936 ~ 2060451839

□□IP□□□□□□□“*”□□□□□□□□□□□□□□□□□IP□□□□□5-9□□□



□5-9 □□□□□□□□□□□□□□IP□□□□□□□

□□□□□IP□□□□□□□□□□□□IP□□□□□10□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□“*”□□□□□□□□□□□□□□□□□□□□□□□□IP□□□□□□□□

□□□□□□“122.202.2.0”□□□□□□□□□□□□□□“2060059136”□□□□□□□□□□□□□□□□□□□□□“2060451839”□□□□□□□□“□□”□□□□“*”□□□□□□□□□□□□□□□□

□□□□□□Node.js□□□□□□□□□□□□□□CSV□□□□□ip.csv□

□□,202.127.0.0,202.127.4.255

□□,122.200.64.0,122.207.255.255

□□□□node-csv□□[14]□□□csv□□□

```
var fs = require('fs');
var csv = require('csv');
```

```
csv.parse(fs.readFileSync('ip.csv', 'utf8'), function (err, records) {
  records.forEach(function (record) {
    importIP(record);
  });
});
```

□□□□□□□node-csv-parser□□□□□□importIP□□□□□□□□□□□□□

```
var Redis = require('redis');
var redis = new Redis();
//□ IP □□□□□□ Redis
//□□□□□"['□□', '202.127.0.0', '202.127.4.255']"
function importIP (data) {
  var location = data[0];
  var minIP = convertIPtoNumber(data[1]);
  var maxIP = convertIPtoNumber(data[2]);
  //□□□□□□□□□□□□□□□'ip'
  redis.zadd('ip', minIP, '*' + location, maxIP, location);
}
```

□□convertIPtoNumber□□□□□IP□□□□□□□□□□□

```
//□ IP □□□□□ 10 □□□□
//convertIPtoNumber('127.0.0.1') => 2130706433
function convertIPtoNumber(ip) {
  var result = '';
  ip.split('.').forEach(function (item) {
    item = ~~item;
    item = item.toString(2);
    item = pad(item, 8);
```

```
        result += item;
    });
    return parseInt(result, 2);
}
pad□□□□□□□□□□□□8□□
//□□□□□□'0'□
//pad('11', 3) => '011'
function pad(num, n) {
    var len = num.length;
    while(len < n) {
        num = '0' + num;
        len++;
    }
    return num;
}
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
var readline = require('readline');
var rl = readline.createInterface({
    input: process.stdin,
    output: process.stdout
});
rl.setPrompt('IP> ');
rl.prompt();
rl.on('line', function (line) {
    ip = convertIPtoNumber(line);
    redis.zrangebyscore('ip', ip, '+inf', 'LIMIT', '0', '1',
function (err,result) {
    if (!Array.isArray(result) || result.length === 0) {
      //[illegible] IP [illegible] IP [illegible]
      console.log('No data.');
    } else {
      var location = result[0];
      if (location[0] === '*') {
        //[illegible] IP [illegible] IP [illegible]
        console.log('No data.');
      } else {
        console.log(location);
      }
    }
    rl.prompt();
  });
});
```

[illegible]

```
$ node ip_search.js
IP> 127.0.0.1
No data.
IP> 122.202.23.34
[illegible]
IP> 202.127.3.3
[illegible]
```

[illegible]“*”[illegible]IP[illegible]

[illegible]

[1]. https://github.com/nrk/predis

[2]. https://github.com/nicolasff/phpredis

[3]. PSR-0 [illegible]PHP Framework Interoperability Group [illegible]PHP [illegible]https://github.com/php-fig/fig-standards/blob/master/accepted/PSR-0.md[illegible]

[4]. https://github.com/redis/redis-rb

[5]. https://github.com/andymccurdy/redis-py

[6]. ZINTERSTORE [illegible]1[illegible]

[7]. https://github.com/mranney/node_redis

[8]. https://github.com/luin/ioredis

[9]. http://nodejs.org

[10]. https://github.com/caolan/async

[11]. https://github.com/creationix/step

[12]. https://github.com/tj/co

[13]. [illegible]

[14]. [illegible]https://github.com/wdavidw/node-csv[illegible] npm install csv[illegible]

[illegible]6[illegible] [illegible]

[illegible]5[illegible]4[illegible]Redis[illegible] Redis [illegible]“Redis[illegible]”[illegible]

[illegible]——“Redis[illegible]”[illegible]

6.1 [illegible]

4.2.2 [illegible] IP [illegible] 1 [illegible]100[illegible]

```
$isKeyExists = EXISTS rate.limiting:$IP
if $isKeyExists is 1
   $times =INCR rate.limiting:$IP
   if $times > 100
      print [illegible]
      exit
else
   MULTIr
   INCRrate.limiting:$IP
   EXPIRE$keyName, 60
   EXEC
```

[illegible]WATCH[illegible]rate.limiting:$IP[illegible]Redis[illegible]5[illegible]

[illegible]Redis[illegible]“RATELIMITING”[illegible]

```
if RATELIMITING rate.limiting:$IP, 60, 100
    print [illegible]
else
    # [illegible]
```

[illegible]Redis[illegible] Redis [illegible]Redis[illegible]

6.1.1 [illegible]

Redis[illegible]2.6[illegible]Lua[illegible]Redis[illegible]Lua[illegible]Redis[illegible]6.1[illegible]Lua[illegible]Redis[illegible]

[illegible]1[illegible]6.1[illegible]Redis[illegible]5[illegible]

[illegible]2[illegible]Redis [illegible]

[illegible]3[illegible] Redis [illegible]

6.1.2 [illegible]

[illegible]Redis[illegible]Lua[illegible]

```
local times = redis.call('incr', KEYS[1])
if times == 1 then
   -- KEYS[1][illegible]
   redis.call('expire', KEYS[1], ARGV[1])
end
if times > tonumber(ARGV[2]) then
   return 0
end
return 1
```

[illegible]Lua[illegible]6.2[illegible]Lua[illegible]Redis[illegible]

[illegible]ratelimiting.lua[illegible]

```
$redis-cli --eval /path/to/ratelimiting.lua
rate.limiting:127.0.0.1 , 10 3
```

[illegible]--eval[illegible]redis-cli[illegible]Lua[illegible] /path/to/ratelimiting.lua [illegible] ratelimiting.lua [illegible] Lua [illegible]“,”[illegible]rate. limiting:127.0.0.1[illegible] KEYS[1][illegible]“,”[illegible]10[illegible]3[illegible]ARGV[1][illegible]ARGV[2][illegible]10[illegible]3[illegible]10[illegible]3[illegible]1[illegible]0[illegible]

[illegible] [illegible]“,”[illegible]

[illegible]KEYS[illegible]ARGV[illegible]6.3[illegible]Lua[illegible]

6.2 Lua[illegible]

Lua[1] [illegible]Lua [illegible]“[illegible]”[illegible]6-1[illegible]Lua[illegible]“[illegible]”[illegible]

[illegible]6-1 Lua[illegible]

[illegible]Lua[illegible]iPhone[illegible] N [illegible] N [illegible]N[illegible]N[illegible]App Store[illegible]N[illegible]N[illegible]N[illegible]N[illegible]“[illegible]”[illegible] App Store [illegible]——[illegible]Lua[illegible]Lua[illegible]

```
function feed(timeSinceLastFeed)
   local hungerValue = 0
   if timeSinceLastFeed > 3600
      hungerValue = ((timeSinceLastFeed - 3600) /
timeSinceLastFeed) * 200
   return hungerValue
```

```
end
```

[illegible]Lua[illegible]Lua[illegible]feed[illegible]feed[illegible]

[illegible]iOS[illegible]Lua[illegible]2011[illegible]Lua[illegible]Lua[illegible]TIOBE[illegible]10[illegible]Lua[illegible]

[illegible] Redis [illegible] Redis [illegible] Redis [illegible]Redis[illegible]Redis[illegible]2.6[illegible]Lua[illegible]Redis[illegible]

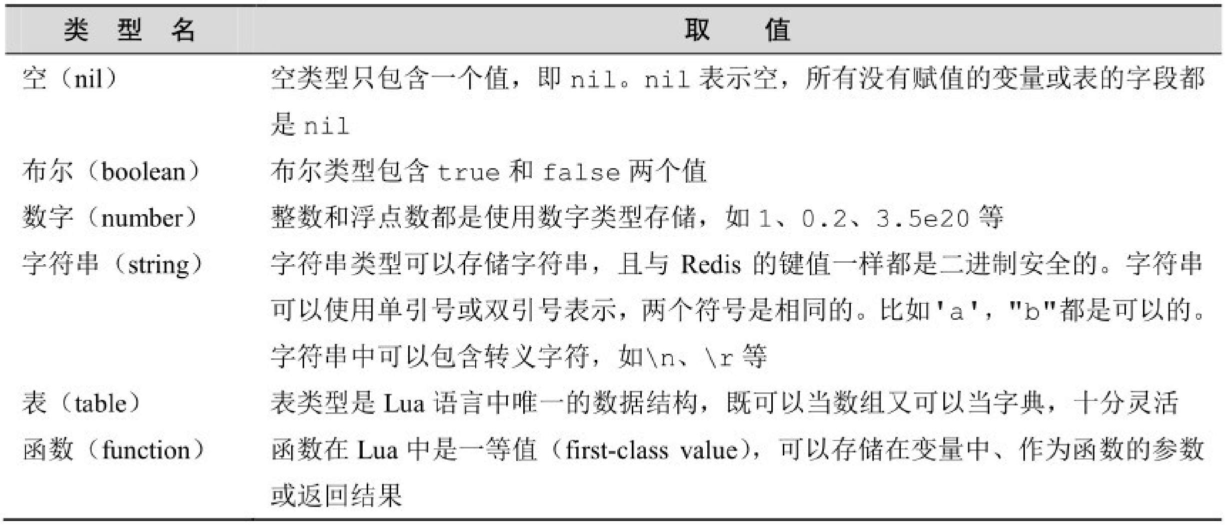
6.2.1 Lua[illegible]

Redis[illegible]Lua 5.1 [illegible]Lua [illegible]Lua[illegible]Redis[illegible]Lua[illegible]Lua [illegible]Roberto Ierusalimschy[2] [illegible]Programming in Lua [illegible]

1[illegible]

Lua [illegible] Redis [illegible]6-1[illegible]

[illegible]6-1 Lua[illegible]



类 型 名	取 值
空（nil）	空类型只包含一个值，即 nil。nil 表示空，所有没有赋值的变量或表的字段都是 nil
布尔（boolean）	布尔类型包含 true 和 false 两个值
数字（number）	整数和浮点数都是使用数字类型存储，如 1、0.2、3.5e20 等
字符串（string）	字符串类型可以存储字符串，且与 Redis 的键值一样都是二进制安全的。字符串可以使用单引号或双引号表示，两个符号是相同的。比如'a'，"b"都是可以的。字符串中可以包含转义字符，如\n、\r 等
表（table）	表类型是 Lua 语言中唯一的数据结构，既可以当数组又可以当字典，十分灵活
函数（function）	函数在 Lua 中是一等值（first-class value），可以存储在变量中、作为函数的参数或返回结果

2□□□

Lua □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□nil□□□

```
a = 1       --□□□□□a□□
print(b)   --□□□□□□□□□□□□□nil
a = nil      --□□□□□□a□□□□□□□□□nil□□□□□□□□□□□□□□□□□□□
```

nil□nil□□□

□ Redis □□□local□□□□□□□□□

```
local c       --□□□□□□□□c□□□□□nil
local d = 1   --□□□□□□□□d□□□□1
local e, f   --□□□□□□□□□□□□
```

□□□□□□□□□□□□□□□□□□□□

```
local say_hi = function ()
   print 'hi'
end
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Lua□□□□□□□□□□□□□□□□□

```
and       break   do       else       elseif
end       false   for       function   if
```

in local nil not or

repeat return then true until while

□□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
local x = 10
if true then
   local x = x + 1
   print(x)
   do
      local x = x + 1
      print(x)
   end
   print(x)
end
print(x)
```

□□□□□□

```
11
12
11
10
```

3□□□

Lua□□□□□□□□□□□□

□□□□□--□□□□□□□□□□□□□□□□□□□□□□□□□□□--□□□□□□□□□

□□□□□--[[□□□□]]□□□□□

```
--[[
□□□□□□□□
]]
```

4□□□

Lua□□□□□□□□□□

```
local a, b = 1, 2   -- a□□□1□b□□□2
local c, d = 1, 2, 3   -- c□□□1□d□□□2□3□□□□
local e, f = 1       -- e□□□1□f□□□nil
```

□□□□□□□□□Lua□□□□□□□□□□□□□□

```
local a = {1, 2, 3}
local i = 1
i, a[i] = i + 1, 5
```

Lua□□□□□□□□□□□□□□□□□□<□□□□ i, a[1] = 2, 5□□□□□□ i□□□2□a□□{5, 2, 3}[3]□

Lua□□□□□□□□□□□□□□□□□□

5□□□□

Lua□□□5□□□□□

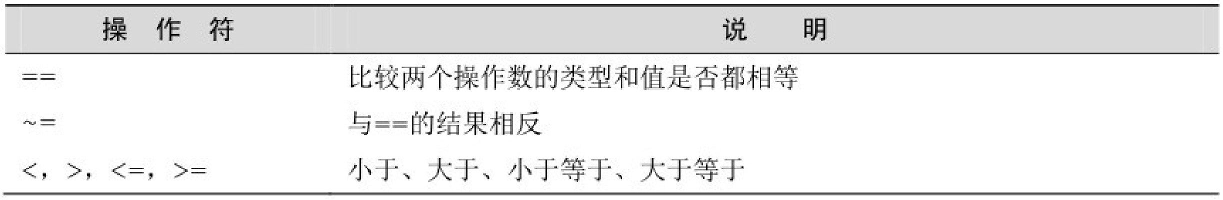
□1□□□□□□□□□□□□□□□□□+□-□*□/□%□□□□□-□□□□□□□□□□□□□□□□^□

□□□□□□□□□□□□□□□□□□□□□□□□□□□

```
print('1' + 1)      -- 2
print('10' * 2)      -- 20
```

□2□□□□□□□Lua□□□□□□□□6-2□□□

□6-2 Lua□□□□□□



操　作　符	说　　明
==	比较两个操作数的类型和值是否都相等
~=	与==的结果相反
<，>，<=，>=	小于、大于、小于等于、大于等于

□□

```
print(1 == '1')         -- false,□□□□□□□□□□□□□□□□□□
```

print({'a'} == {'a'})   -- false,[illegible]

[illegible]true[illegible]

print(1 == tonumber('1'))

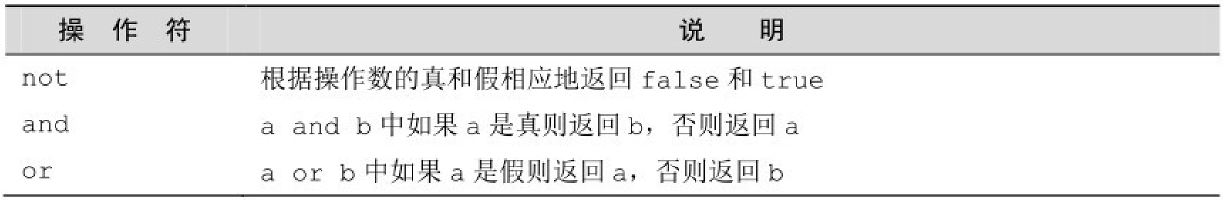
print('1' == tostring(1))

[illegible]tonumber[illegible]

print(tonumber('F', 16)) --[illegible]'F'[illegible] 16 [illegible] 10 [illegible] 15

[illegible]3[illegible]Lua[illegible]6-3[illegible]

[illegible]6-3 Lua[illegible]



操 作 符	说 明
not	根据操作数的真和假相应地返回 false 和 true
and	a and b 中如果 a 是真则返回 b，否则返回 a
or	a or b 中如果 a 是假则返回 a，否则返回 b

[illegible]nil[illegible]false[illegible]0[illegible]Ruby[illegible]

print(1 and 5)   -- 5

print(1 or 5)   -- 1

print(not 0)   -- false

print('' or 1)   -- ''

Lua [illegible] false and foo()[illegible]Lua [illegible] foo[illegible]foo[illegible]false[illegible]or[illegible]

[illegible]4[illegible]..[illegible]

print('hello' .. ' ' .. 'world!')   -- 'hello world!'

[illegible]

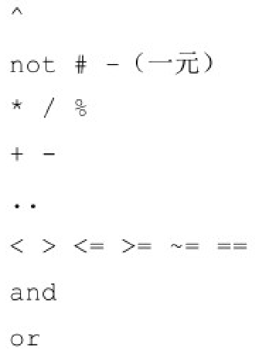
print('The price is ' .. 25)   -- 'The price is 25'

[illegible]5[illegible]Lua 5.1 [illegible]#[illegible]

print(#'hello')   -- 5

[illegible]6-4[illegible]

□6-4 □□□□□□□□□□□□□□□□□



```
^
not # -（一元）
* / %
+ -
..
< > <= >= ~= ==
and
or
```

6□if□□

Lua□if□□□□□□□

```
if □□□□□ then
   □□□
elseif □□□□□ then
   □□□
else
   □□□
end
```

□□ □□□□□□Lua□□□ nil□ false□□□□□□□□□□□□□□□□ 0□□□□□□□□□□□□□□□□□□□□□□□□ Redis □ EXISTS □□□□□ 1□ 0 □□□□□□□□□□□□□□□□□□□ EXISTS □□□□□□□ 1 □□ 0□ exists □□□□□□ true□

```
if redis.call('exists', 'key') then
   exists = true
else
   exists = false
end
```

□□□□□ redis.call('exists', 'key')□□□ redis.call('exists', 'key') == 1 □□□□

Lua□JavaScript□□□□□□□□□;□□□□□□□□□□Lua□□□□□;□Lua□□□□□□□□□□□Lua□□□□□□□□□□□□□□□□□□□□□□□□□□

```
a = 1
b = 2
if a then
   b = 3
else
   b = 4
end
```

□□□□

```
a = 1 b = 2 if a then b = 3 else b = 4 end
```

□□□□□□□□□□□□

```
a =
1 b = 2 if a
then b = 3 else b
= 4 end
```

□□□□□□□□□□□□□□□□□□□□□□□

7□□□□□

Lua□□ while, repeat□ for□□□□□

while□□□□□□□

```
while □□□□□ do
   □□□
end
```

repeat□□□□□□□

```
repeat
□□□
until □□□□□
```

for□□□□□□□□□□□□□□□□

```
for □□=□□, □□, □□ do
   □□□
end
```

□□□□□□□□□□□□□□1□□□□□for□□□□1□100□□□

```
local sum = 0
for i = 1, 100 do
   sum = sum + i
end
```

□□ for□□□□□□□□□□□□□□ i□□□□□□□□□□□ for□□□□□□□□□□□
local□□□□□□□□□□□□

for□□□□□□□□□

```
for □□ 1, □□ 2, ..., □□ N in □□□ do
   □□□
end
```

□□□Redis□□□□□□□□□□□□for□□□□□□□□□□□□□□□□

8□□□□

□□Lua□□
□□□□□□□□

```
a = {}              --□□□a□□□□□□□
a['field'] = 'value'   --□field□□□□value
print(a.field)       --□□□□□'value'□a.field□a['field']□□□□□
people = {          --□□□□□□□
   name = 'Bob',
   age = 29
}
print(people.name)   --□□□□□□'Bob'
```

□□□□□□□□□□□□□□□□□□□□□□

```
a = {}
a[1] = 'Bob'
a[2] = 'Jeff'
```

□□□□□□□□□

```
a = {'Bob', 'Jeff'}
print(a[1])             --□□□□□□'Bob'
```

□□ Lua□□□□[4]□□□□□1 □□□□□□□0□

□□□□□□□□□for□□□□□□□□□□

```
for index, value in ipairs(a) do
   print(index)          -- index□□□□a□□□
   -- value□□□□a□□print(value)
end
```

□□□□□□□

```
1
Bob
2
Jeff
```

ipairs□Lua□□□□□□□□□□□□□□□□□□□□□□□□□□□□□for□□□□□□□□□□

```
for i = 1, #a do
   print(i)
   print(a[i])
end
```

□□□□□□□□□□□#a□□□□□□□a□□□□

Lua□□□□□□□□□pairs□□□□□□□□□□□□□□□

```
people = {
  name = 'Bob',
  age = 29
}
for index, value in pairs(people) do
  print(index)
  print(value)
end
```

[illegible]

```
name
Bob
age
29
```

pairs[illegible]ipairs[illegible]nil[illegible]1[illegible]nil[illegible]

9[illegible]

[illegible]

```
function ([illegible])
  [illegible]
end
```

[illegible]

```
local square = function (num)
  return num * num
end
```

[illegible]Lua[illegible]

```
local function square (num)
  return num * num
end
```

[illegible]

```
local square
square = function (num)
   return num * num
end
```

[illegible]square[illegible]

[illegible] nil[illegible]...[illegible]

```
local function square (...)
   local argv = {...}
   for i = 1, #argv do
      argv[i] = argv[i] * argv[i]
   end
   return unpack(argv)
end
a, b, c = square(1, 2, 3)
print(a)
print(b)
print(c)
```

[illegible]

```
1
4
9
```

[illegible]square[illegible]...[illegible]argv[illegible] unpack [illegible] argv [illegible] 3 [illegible]return unpack(argv)[illegible] return argv[1], argv[2], argv[3][illegible]

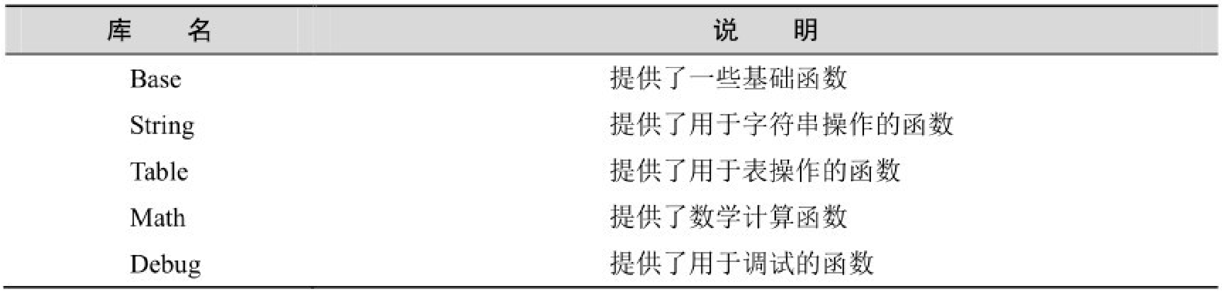
[illegible]Lua[illegible]return[illegible]break[illegible]end[illegible]else[illegible]until[illegible]do[illegible]end[illegible]

6.2.2 [illegible]

Lua [illegible] ipairs [illegible]pairs[illegible] tonumber[illegible] tostring[illegible] unpack[illegible]“Base”[illegible]

Redis[illegible]Lua[illegible]6-5[illegible]

[illegible]6-5 Redis[illegible]Lua[illegible]



库　　名	说　　明
Base	提供了一些基础函数
String	提供了用于字符串操作的函数
Table	提供了用于表操作的函数
Math	提供了数学计算函数
Debug	提供了用于调试的函数

[illegible]Lua[illegible][5][illegible]

1[illegible]String[illegible]

String [illegible] string.len (string_var)[illegible]string_var:len()[illegible]

[illegible]1[illegible]

string.len(string)

string.len()[illegible]#[illegible]

```
> print(string.len('hello'))
```

5

```
> print(#'hello')
```

5

[illegible]2[illegible]

string.lower(*string*)

string.upper(*string*)

□□□

```
> print(string.lower('HELLO'))
hello
> print(string.upper('hello'))
HELLO
```

□3□□□□□□□□

string.sub(*string start* [,*end* string.sub()□□□□□□□□□□□□□*start* □□□*end* □□□□□□□□□□□□1□□□□□□□□□□□□−1□□□□□□□□□end□□□□□□□□□□−1□□□□□□□□□□□□

□□□

```
> print(string.sub('hello', 1))
hello
> print(string.sub('hello', 2))
ello
> print(string.sub('hello', 2, -2))
ell
> print(string.sub('hello', -2))
lo
```

2□Table□

Table□□□□□□□□□□□□□□□□□□□□□□

□1□□□□□□□□□□□□

table.concat(*table sep i j*

table.concat()□JavaScript□□join()□□□□□□□□□□□□□□□□□□□□□*sep* □□□□□□□□□□□□□□□□□i□j□□□□□□□□□□□□□□□□□□□□□□□1□□□□□□□□□□□□□□□□

```
> print(table.concat({1, 2, 3}))
```

```
123
> print(table.concat({1, 2, 3}, ',', 2))
2,3
> print(table.concat({1, 2, 3}, ',', 2, 2))
2
```

□2□□□□□□□□□□

table.insert(*table pos value*

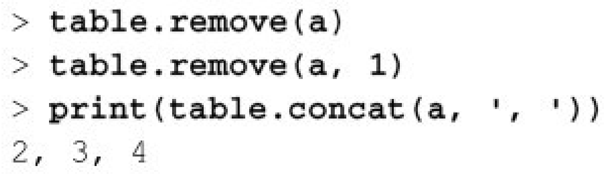
□□□□□□□*pos* □□□□value□□□□□□□□□□□□□□□*pos* □□□□□□□□1□□□□□□□□□□□□

```
> a = {1, 2, 4}
> table.insert(a, 3, 3)
> table.insert(a, 5)
> print(table.concat(a, ', '))
1, 2, 3, 4, 5
```

□3□□□□□□□□□□□□

table.remove(*table pos*

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□*pos* □□□□□□□□□□□□□□□□□□□□□□□□



```
> table.remove(a)
> table.remove(a, 1)
> print(table.concat(a, ', '))
2, 3, 4
```

3□Math□

Math□□□6-6□

□6-6 Math□□□□□□

函数定义	说　明
math.abs(x)	获得数字的绝对值
math.sin(x)	求三角函数 sin 值
math.cos(x)	求三角函数 cos 值
math.tan(x)	求三角函数 tan 值
math.ceil(x)	进一取整，如 1.2 取整后是 2
math.floor(x)	向下取整，如 1.8 取整后是 1
math.max(x, …)	获得参数中最大的值
math.min(x, …)	获得参数中最小的值
math.pow(x, y)	获得 xy 的值
math.sqrt(x)	获得 x 的平方根

□□□□□Math□□□□□□□□□□□

```
math.random([m, [, n]])

math.randomseed(x)
```

math.random()□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□[0, 1)□□□□

□□□□m□□□□□□□□[1,m]□□□□

□□□□□m□n□□□□□□□□[m,n]□□□□

math.random□□□□□□□□□□□□□□seed□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□math.randomseed()□□□□□□□□□□□□

```
> math.randomseed(1)
> print(math.random(1, 100))
1
> print(math.random(1, 100))
14
> print(math.random(1, 100))
76
> math.randomseed(1)
> print(math.random(1, 100))
1
```

```
> print(math.random(1, 100))
14
```

```
> print(math.random(1, 100))
76
```

6.2.3 □□□

□□□□□□□□Redis□□□cjson□[6]□cmsgpack□[7]□□□□JSON□MessagePack□□□□Redis□□□□□□□□□□□□□□□□□□□□cjson□cmsgpack□□□□□□□□□□□□□□□□□□□□□□

```
local people = {
   name = 'Bob',
   age = 29
}
--□□ cjson □□□□□□□□
local json_people_str = cjson.encode(people)
--□□ cmsgpack □□□□□□□□
local msgpack_people_str = cmsgpack.pack(people)
--□□ cjson □□□□□□□□□□□□□□
local json_people_obj = cjson.decode(people)
print(json_people_obj.name)
--□□ cmsgpack □□□□□□□□□□□□□□
local msgpack_people_obj = cmsgpack.unpack(people)
print(msgpack_people_obj.name)
```

6.3 Redis□Lua

□□Redis□□□□□□□□□Redis□□□□□□□□□□Redis□Lua□□□□□□

6.3.1 □□□□□□Redis□□

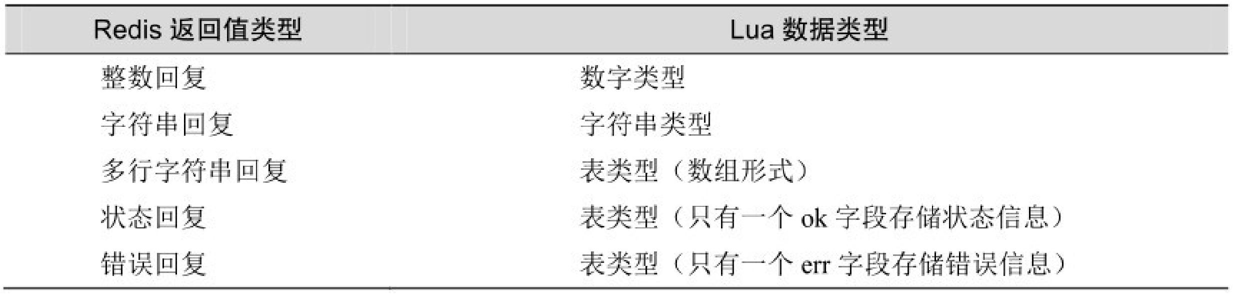
□□□□□□□□redis.call□□□□Redis□□□□□□□□

redis.call('set', 'foo', 'bar')

local value = redis.call('get', 'foo')   -- value□□□bar

redis.call□□□□□□□□Redis□□□□□□□□□2□□□□Redis□□□□□□□5□□□□redis.call□□□□□5□□□□□□□□□□□□Lua□□□□□□□□□□□□□□□6-7□□□□□□□□□□□□□□Lua□false□□

□6-7 Redis□□□□□□Lua□□□□□□□□



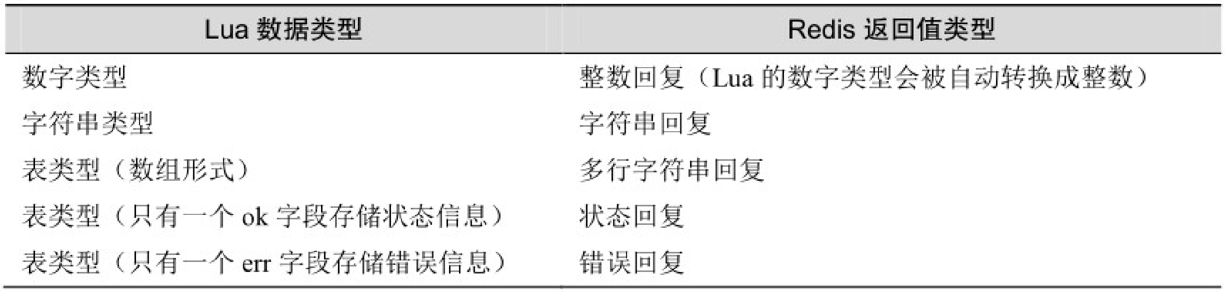
Redis 返回值类型	Lua 数据类型
整数回复	数字类型
字符串回复	字符串类型
多行字符串回复	表类型（数组形式）
状态回复	表类型（只有一个 ok 字段存储状态信息）
错误回复	表类型（只有一个 err 字段存储错误信息）

Redis□□□□redis.pcall□□□□□□redis.call□□□□□□□□□□□□□□□□□redis.pcall□□□□□□□□□□□□redis.call□□□□□□□□□□□□□□□

6.3.2 □□□□□□□

□□□return□□□□□□□□□□□□□□□□□return□□□□□□□nil□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□Lua□□□□□□□Redis□□□□□□□□□□□□□□□□6-8□□□Lua□false□□□□□□□□□□□□□□□

□6-8 Lua□□□□□Redis □□□□□□□□□



Lua 数据类型	Redis 返回值类型
数字类型	整数回复（Lua 的数字类型会被自动转换成整数）
字符串类型	字符串回复
表类型（数组形式）	多行字符串回复
表类型（只有一个 ok 字段存储状态信息）	状态回复
表类型（只有一个 err 字段存储错误信息）	错误回复

6.3.3 □□□□□□

1□EVAL □□

□□□□□□□□□□□□□□□□□□□□□Redis□□□EVAL□□□□□□□□□□□□□Redis□□□□□□□□□□□EVAL□□□□□□□EVAL□□□key□□□□□ [key ...] [arg ...]□□□□□key □arg □□□□□□□□□□□□□□□□□□□□□□□□□□□KEYS □ ARGV □□□□□□□□□□□□□□□□□□□□□□□□□□SET□□□□□□□□□□□□□□□□□□□□□□□□□□

return redis.call('SET', KEYS[1], ARGV[1])

□□□□redis-cli□□□□□□

redis> EVAL "return redis.call('SET', KEYS[1], ARGV[1])" 1 foo bar

OK

redis> GET foo

"bar"

□□□□□□□□□□□□key □□□□□□□□□□□arg □□□□□□□□□□6-4□□□□□

□□ EVAL□□□□□□□□□□□□□□□□□□□□□□□□ KEYS□ ARGV□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□0□□

2□EVALSHA □□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□□□□□□□□□Redis □□□ EVALSHA□□□□□□□□□□□□□□ SHA1 □□□□□□

[illegible] EVAL [illegible] SHA1 [illegible]

Redis [illegible] EVAL [illegible] SHA1 [illegible] EVALSHA[illegible]Redis[illegible]“NOSCRIPT No matching script. Please use EVAL.”

[illegible]EVALSHA[illegible]

[illegible]1[illegible]SHA1[illegible]EVALSHA[illegible]

[illegible]2[illegible]“NOSCRIPT”[illegible]EVAL[illegible]

[illegible] Redis [illegible] node_redis [illegible] EVAL [illegible]node_redis [illegible] EVALSHA[illegible]EVAL[illegible]

6.3.4 [illegible]

[illegible]Redis[illegible]

1[illegible]

[illegible]ID[illegible]HGETALL[illegible]

Predis[illegible]Redis[illegible]HMGETALL[illegible]M[illegible]

```
<?php
class HMGetAll extends
Predis\Command\ScriptedCommand
{
  //[illegible] KEYS [illegible]
  //false [illegible]
  public function getKeysCount()
  {
    return false;
  }
  //□□□□□□
  public function getScript()
  {
    return
<<<LUA
local result = {}
for i, v in ipairs(KEYS) do
  result[i] = redis.call('HGETALL', v)
end
return result
LUA;
  }
}
$client = new Predis\Client();
//□□ hmgetall □□
$client->getProfile()->defineCommand('hmgetall', 'HMGetAll');
//□□ hmgetall □□
$value = $client->hmgetall('user:1', 'user:2', 'user:3');
```

2□□□□□□□□□□□□□□□□□□

□□□□□□□LPOP□RPOP□□□ Redis □□□□□□□□□□□□□

```
WATCH zset
$element = ZRANGE zset 0 0
MULTI
```

```
ZREM zset $element
EXEC
```

[illegible]WATCH[illegible]zset[illegible]

redis-py [illegible] EVAL [illegible] EVALSHA [illegible] register_script[illegible]

```
r = redis.StrictRedis()
lua = """
   local element = redis.call('ZRANGE', KEYS[1], 0, 0)[1]
   if element then
      redis.call('ZREM', KEYS[1], element)
   end
   return element
"""
ztop = r.register_script(lua)
# [illegible] ZTOP[illegible]
print ztop(keys=['zset'])
```

3[illegible]JSON

3.2[illegible]JSON[illegible]

[illegible]

```
//[illegible]
function Student(name) {
   this.name = name;
   this.courses = {};
}
```

```
//[illegible]
Student.prototype.addCourse = function(name, score) {
    this.courses[name] = score;
}
```

[illegible]

```
//[illegible] Bob[illegible]
var bob = new Student('Bob');
bob.addCourse('Mathematics', 80);
bob.addCourse('Literature', 95);
//[illegible] Jeff[illegible]
var jeff = new Student('Jeff');
jeff.addCourse('Mathematics', 85);
jeff.addCourse('Chemistry', 70);
```

[illegible]Redis[illegible]JSON[illegible]Redis[illegible]

```
var redis = require("redis");
var client = redis.createClient();
//[illegible] JSON [illegible]
client.mset(
    'user:1', JSON.stringify(bob),
    'user:2', JSON.stringify(jeff)
);
```

[illegible]Lua[illegible]

```
var lua =    " \
    local sum = 0 \
    local users = redis.call('mget', unpack(KEYS)) \
    for _, user in ipairs(users) do \
        local courses = cjson.decode(user).courses \
        for _, score in pairs(courses) do \
          sum = sum + score \
        end \
      end \
      return sum \
    ";
```

[illegible]node_redis[illegible]eval[illegible]SHA1[illegible]EVALSHA[illegible]EVAL[illegible]

```
    client.eval(lua, 2, 'user:1', 'user:2', function (err, sum) {
      //[illegible] 330
      console.log(sum);
    });
```

[illegible] [illegible] unpack[illegible] KEYS[illegible]

6.4 [illegible]

[illegible]KEYS[illegible]ARGV[illegible]

6.4.1 KEYS[illegible]ARGV

[illegible] KEYS [illegible] ARGV[illegible] EVAL "return redis.call('get', KEYS[1])" 1 user:Bob [illegible] user:Bob [illegible] EVAL "return redis.call('get', 'user:' .. ARGV[1])" 0 Bob [illegible] Redis [illegible] KEYS [illegible]

[illegible]Redis[illegible]3.0[illegible]cluster[illegible]KEYS[illegible]

[illegible] ID [illegible]

```lua
local sum = 0
local users = redis.call('SMEMBERS', KEYS[1])
for _, user_id in ipairs(users) do
   local user_age = redis.call('HGET', 'user:' .. user_id, 'age')
   sum = sum + user_age
end
return sum / #users
```

[illegible] 4 [illegible] KEYS [illegible]ID[illegible]ID[illegible]

6.4.2 [illegible]

Redis [illegible] Lua [illegible]Redis[illegible]Redis[illegible]

[illegible]AOF[illegible]7[illegible]

[illegible]Redis [illegible]

[illegible]Redis [illegible] math.random [illegible] math.randomseed [illegible] math.randomseed(tonumber(ARGV[[illegible]]))[illegible] math.random[illegible]

[illegible]SMEMBERS[illegible]HKEYS[illegible] Redis [illegible] Lua[illegible]table.sort [illegible]

```
function __redis__compare_helper(a,b)
   if a == false then a = '' end
   if b == false then b = '' end
   return a < b
end
table.sort(result_array, __redis__compare_helper)
```

[illegible]Redis[illegible]lua_random_dirty[illegible]“Write commands not allowed after non deterministic commands.”[illegible]Redis[illegible]SPOP[illegible]SRANDMEMBER[illegible]RANDOMKEY[illegible]TIME[illegible]

6.4.3 [illegible]

[illegible]EVAL[illegible]EVALSHA[illegible]Redis[illegible]4[illegible]

1[illegible] `SCRIPT LOAD`

[illegible]EVAL[illegible]Redis[illegible]SHA1[illegible]EVALSHA[illegible] SCRIPT LOAD[illegible]SHA1[illegible]

```
redis> SCRIPT LOAD "return 1"
"e0e1f9fabfc9d4800c877a703b823ac0578ff8db"
```

2[illegible] SCRIPT EXISTS

SCRIPT EXISTS[illegible]1[illegible]SHA1 [illegible]

```
redis>
SCRIPT EXISTS e0e1f9fabfc9d4800c877a703b823ac0578ff8db abcdefghijklmnopqrst
uvwxyzabcdefghijklmn
1) (integer) 1
2) (integer) 0
```

3[illegible] SCRIPT FLUSH

Redis [illegible] SHA1 [illegible] SCRIPT FLUSH[illegible]

```
redis> SCRIPT FLUSH
OK
```

4[illegible] SCRIPT KILL

[illegible] SCRIPT KILL[illegible]

6.4.4 [illegible]

Redis[illegible]Redis[illegible] Redis [illegible]Redis [illegible]lua-time-limit[illegible]5[illegible]Redis[illegible]“BUSY”[illegible]redis-cli[illegible]A[illegible]B[illegible]A[illegible] redis A> `EVAL "while true do end" 0`

□□□□□B□□□□□□□□

redis B> `GET foo`

□□□□B□□□□□□□□□□□□□□□□Redis□□□□□A□□□□□□□□□□□□□□□□□□□□□□□□□□□5□□□□B□□□“BUSY”□□□

(error) BUSY Redis is busy running a script. You can only call SCRIPT KILL or SHUTDOWN

NOSAVE.

(3.74s)

□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□SCRIPT KILL □ SHUTDOWN NOSAVE□

□□□B□□□ SCRIPT KILL□□□□□□□□□□□□□□

redis B> `SCRIPT KILL`

OK

□□□□□□□□□□□A□□□□□□□

(error) ERR Error running script (call to f_694a5fe1ddb97a4c6a1bf299d9537c7d3d0f84e7):

Script killed by user with SCRIPT KILL...

(28.77s)

□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□□□ SET□LPUSH □ DEL □□□□□ SCRIPT KILL □□A□□□□

redis A>

`EVAL "redis.call('SET', 'foo', 'bar') while true do end" 0`

5□□□□□□B□□□□□□□□□

redis B> `SCRIPT KILL`

(error) UNKILLABLE Sorry the script already executed write commands against the dataset. You can either wait the script termination or kill the server in an hard way using the SHUTDOWN NOSAVE command.

[illegible] SHUTDOWN NOSAVE [illegible] Redis[illegible] 2 [illegible]SHUTDOWN[illegible]Redis[illegible] SHUTDOWN NOSAVE[illegible] SHUTDOWN[illegible] 7.1 [illegible]

[illegible] Redis [illegible]Redis[illegible]

[illegible]

[1]. http://www.lua.org

[2]. http://www.inf.puc-rio.br/~roberto

[3]. Lua [illegible]1[illegible]

[4]. [illegible]1 [illegible]

[5]. http://www.lua.org/manual/5.1/manual.html#5

[6]. http://www.kyne.com.au/~mark/software/lua-cjson.php

[7]. cmsgpack[illegible]Redis [illegible]Salvatore Sanfilippo[illegible] https://github.com/antirez/lua-cmsgpack[illegible]

[illegible]7[illegible] [illegible]

[illegible] Redis[illegible]

Redis[illegible]Redis[illegible] Redis [illegible]

[illegible]1[illegible]Redis[illegible]

[illegible]2[illegible] Redis [illegible]

[illegible] Redis [illegible]

Redis[illegible]RDB[illegible]AOF[illegible]“[illegible]”[illegible]

7.1 RDB[illegible]

RDB[illegible]snapshotting[illegible]Redis[illegible]“[illegible]”[illegible]Redis[illegible]

- [illegible]
- [illegible] SAVE[illegible] BGSAVE[illegible]
- [illegible] FLUSHALL[illegible]
- [illegible]replication[illegible]

□□□□□□□□□□

7.1.1 □□□□□□□□□□□□□

Redis□□□□□□□□□□□□□□□□□□□□□Redis□□M□□□□□□□□N□□□□□M□□□□□□□□□□□N□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□□3□□□□

```
save 900 1
save 300 10
save 60 10000
```

□□□□□□□□□□□□□ save □□□□□□□□□□□□□□□□□□□□□“□”□□□□□□□□□□□□save 900 1 □□□□□ 15 □□□900 □□□□□□□□□□□□□□□□□□□□□□□□□save 300 10□□□300□□□□□10□□□□□□□□□□□

7.1.2 □□□□ SAVE□ BGSAVE□□

□□□ Redis □□Redis□□□□□□□□□□□□□□□

1□SAVE□□

□□□SAVE□□□□Redis□□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□

2□BGSAVE□□

□□□□□□□□□□□□□ BGSAVE □□□BGSAVE □□□ BGSAVE□Redis□□□□□ OK□□□□□□□□□□□□□□□□□□□□□□□□□□ LASTSAVE□□□□□□□□□□□□□□□□□□□□□□□□□Unix□□□□□□

```
redis> LASTSAVE
```

```
(integer) 1423537869
```

[illegible]7.1.5[illegible]Redis[illegible]

7.1.3 [illegible] FLUSHALL[illegible]

[illegible] FLUSHALL [illegible]Redis [illegible]Redis[illegible]1[illegible]10 000[illegible]FLUSHALL[illegible]

[illegible]FLUSHALL[illegible]

7.1.4 [illegible]

[illegible]Redis [illegible]8[illegible]RDB[illegible]

7.1.5 [illegible]

[illegible]Redis[illegible]Redis[illegible]Redis[illegible]dump.rdb[illegible]dir[illegible]dbfilename[illegible]

[illegible]1[illegible]Redis[illegible]fork[illegible]

[illegible]2[illegible]

[illegible]3[illegible] RDB [illegible]

[illegible] fork [illegible] Unix [illegible]copy-on-write[illegible]fork[illegible]

[illegible]RDB[illegible] fork[illegible]

[illegible] fork [illegible]2 GB[illegible]Redis[illegible]1.5 GB[illegible] fork[illegible]3 GB[illegible] Linux [illegible]/etc/sysctl.conf [illegible] vm.overcommit_memory = 1[illegible] sysctl vm.overcommit_memory=1 [illegible]

[illegible] fork [illegible] fork [illegible]

[illegible]Redis[illegible]RDB[illegible] RDB [illegible] RDB [illegible] Redis [illegible]RDB [illegible]rdbcompression [illegible] CPU[illegible]

Redis[illegible]RDB[illegible]1000[illegible]1 GB [illegible]20[illegible]30[illegible]

[illegible]RDB[illegible]Redis[illegible]Redis[illegible]AOF[illegible]

7.2 AOF[illegible]

[illegible]Redis[illegible]AOF[illegible]AOF[illegible]Redis[illegible]Redis [illegible]AOF[illegible]

7.2.1 [illegible]AOF

[illegible]Redis[illegible]AOF[illegible]append only file[illegible]appendonly[illegible]

```
appendonly yes
```

[illegible]AOF[illegible]Redis[illegible]Redis[illegible]AOF[illegible]AOF[illegible]RDB[illegible]dir[illegible]appendonly.aof[illegible]appendfilename[illegible]

```
appendfilename appendonly.aof
```

7.2.2 AOF[illegible]

AOF[illegible]Redis[illegible]AOF[illegible]4[illegible]

```
SET foo 1
SET foo 2
SET foo 3
GET foo
```

Redis[illegible]3[illegible]AOF[illegible]AOF[illegible]

```
*2
$6
SELECT
$1
0
```

```
*3
$3
set
$3
foo
$1
1
*3
$3
set
$3
foo
$1
2
*3
$3
set
$3
foo
$1
3
```

[illegible] AOF[illegible] Redis [illegible] Redis [illegible]Redis[illegible]9.2[illegible]Redis[illegible]3[illegible]2[illegible]AOF[illegible] Redis [illegible]AOF[illegible]

□□Redis□□□□□□□□□□□□□□□□□Redis□□□□□□AOF□□□□□□□□□□□□□
□□□□□

```
auto-aof-rewrite-percentage 100
auto-aof-rewrite-min-size 64mb
```

auto-aof-rewrite-percentage□□□□□□□□□□AOF□□□□□□□□□□□□□AOF□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□AOF□□□□□□□□auto-aof-rewrite-min-size□□□□□□□□□□□□AOF□□□□□□□□AOF□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□BGREWRITEAOF□□□□□AOF□□□

□□□□AOF□□□□□□□□□□

```
*2
$6
SELECT
$1
0
*3
$3
SET
$3
foo
$1
3
```

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ AOF□□□□□□□RDB□□□□□□□□□□□□□□□□□□□

□□□□Redis□□□□□AOF□□□□□□□□□□□□□□□□□□□□□□□□□□□□RDB□□□□□

7.2.3 [illegible]

[illegible]AOF[illegible]AOF[illegible]30[illegible]30[illegible]AOF[illegible]Redis[illegible]AOF[illegible] Redis [illegible] appendfsync [illegible]

```
# appendfsync always
appendfsync everysec
# appendfsync no
```

[illegible]Redis[illegible]everysec[illegible]always[illegible]no[illegible]30[illegible]everysec[illegible]

Redis [illegible] AOF [illegible] RDB[illegible]Redis[illegible]Redis[illegible]AOF[illegible]AOF[illegible]

[illegible]8[illegible] [illegible]

[illegible] Redis [illegible]Redis[illegible]

[illegible]1[illegible] Redis [illegible]

[illegible]2[illegible] Redis [illegible]

[illegible] Redis [illegible]

[illegible] Redis [illegible]sentinel[illegible]cluster[illegible]

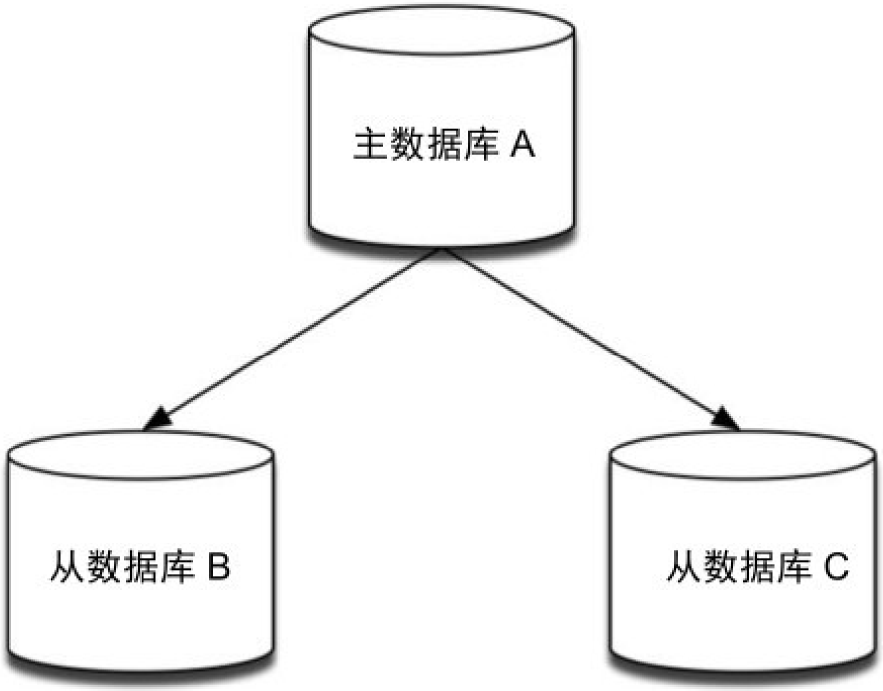
8.1 [illegible]

[illegible]Redis[illegible] Redis [illegible]replication[illegible]

8.1.1 [illegible]

[illegible]master[illegible][1] [illegible]slave[illegible]

[illegible]8-1[illegible]



[illegible]8-1 [illegible]

[illegible] Redis [illegible]“slaveof [illegible]”[illegible]

[illegible] Redis [illegible] Redis[illegible]

```
$ redis-server
```

[illegible]6379[illegible]slaveof[illegible]Redis[illegible]6380[illegible]

```
$ redis-server --port 6380 --slaveof 127.0.0.1 6379
```

[illegible] redis-cli[illegible]A[illegible]

```
$ redis-cli -p 6379
```

[illegible]redis-cli[illegible]B[illegible]

```
$ redis-cli -p 6380
```

[illegible]INFO[illegible]A[illegible]B[illegible]Replication[illegible]

```
redis A> INFO replication
role:master
connected_slaves:1
slave0:ip=127.0.0.1,port=6380,state=online,offset=1,lag=1
master_repl_offset:1
```

[illegible]A[illegible]role[illegible]master[illegible]connected_slaves[illegible]1[illegible]

[illegible]B[illegible]

```
redis B> INFO replication
role:slave
master_host:127.0.0.1
master_port:6379
```

[illegible] B [illegible] role [illegible] slave[illegible]127.0.0.1[illegible] 6379[illegible]

[illegible]A[illegible]SET[illegible]

```
redis A> SET foo bar
OK
```

[illegible]B[illegible]

```
redis B> GET foo
"bar"
```

[illegible]

```
redis B> SET foo hi
```

(error) READONLY You can't write against a read only slave.

□□□□□□□□□□□□□ slave-read-only □ no □□□

□□□□□□□□□□□□□□□□□□□□□□□□□ slaveof□□□□□□□□□□□

□□□□□□□□□□□□ slaveof□□□□□□□□□ SLAVEOF□□□□

```
redis> SLAVEOF 127.0.0.1 6379
```

□□□□□□□□□□□□□□□□□SLAVEOF□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ SLAVEOF NO ONE□□□□□□□□□□□□□□□□□□□□□□□□

8.1.2 □□

□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□

□□□□□□□□□□□□□□ SYNC □□□□□□□□□□ SYNC□□□□□□□□□□□RDB□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□

□□□□□□□□□□□□□Redis 2.6□□Redis 2.8□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible]Redis[illegible]8.1.7[illegible]

[illegible]Redis[illegible]TCP[illegible] telnet [illegible]6379[illegible]

```
$ telnet 127.0.0.1 6379
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
```

[illegible]PING[illegible]

```
PING
+PONG
```

[illegible]+PONG[illegible]AUTH[illegible]Redis[illegible]9.1[illegible]REPLCONF[illegible]

```
REPLCONF listening-port 6381
+OK
```

[illegible]SYNC[2][illegible]foo[illegible]

```
SYNC
$29
REDIS0006?foobar?6_?"
```

[illegible]RDB[illegible]RDB [illegible] dir [illegible]dbfilename[illegible]RDB[illegible] slave-serve-stale-data[illegible]no[illegible]INFO[illegible]SLAVEOF[illegible]“SYNC with master in progress. ”

[illegible]Redis[illegible]9.2[illegible] SET foo hi[illegible]telnet[illegible]

```
*3
$3
set
$3
foo
$2
hi
```

[illegible]

[illegible]RDB[illegible]save[illegible]Redis 2.8.18 [illegible] 8.1.6 [illegible]

[illegible] Redis[illegible]optimistic replication[illegible]Redis[illegible] Redis [illegible]

```
min-slaves-to-write 3
min-slaves-max-lag 10
```

□□□□□□□min-slaves-to-write□□□□□3□□3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

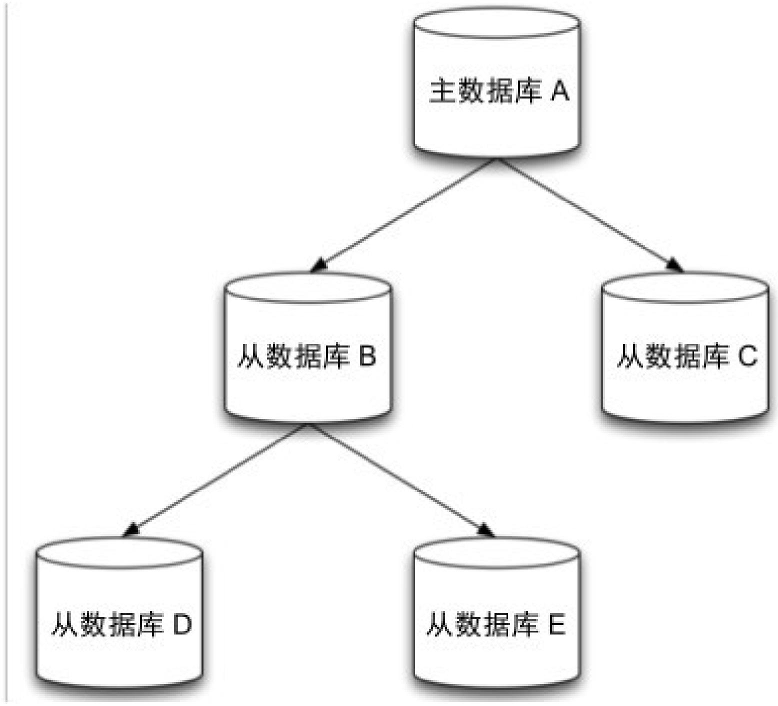
redis> SET foo bar

(error) NOREPLICAS Not enough good slaves to write.

min-slaves-max-lag □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ REPLCONF ACK□□□3□□□□□□□□□□□□□□□□□□□□□□□□□□□ 9 □□□□□□□□□□□□□□□□□□□□□1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□2□□8.2□□□□□□

8.1.3 □□□

□□□8-2□□□□□□A□□□□□□□B□C□□□B□□□□□□□□D□E□□□B□□□□□□□□□□A□C□□□□□□□D□E□□



[illegible]8-2 [illegible]

8.1.4 [illegible]

[illegible]Redis[illegible] SORT [illegible]Redis 3.0 [illegible]8.3[illegible]

8.1.5 [illegible]

[illegible]

[illegible]

[illegible]1[illegible] SLAVEOF NO ONE[illegible]

[illegible]2[illegible]SLAVEOF[illegible]

[illegible] [illegible] Supervisor [illegible]

[illegible]Redis[illegible]8.2[illegible]

8.1.6 [illegible]

8.1.2[illegible]Redis[illegible]RDB[illegible] RDB [illegible]

[illegible]1[illegible]RDB[illegible]save[illegible]Redis[illegible]RDB[illegible]

[illegible]2[illegible]RDB[illegible] Redis [illegible]Redis[illegible]

[illegible]2.8.18[illegible]Redis[illegible]Redis[illegible]

[illegible]

```
repl-diskless-sync yes
```

8.1.7 [illegible]

8.1.2[illegible]SYNC[illegible]Redis 2.8[illegible]2.6[illegible]

[illegible]3[illegible]

[illegible]1[illegible]ID[illegible]run id[illegible]Redis [illegible]ID[illegible]ID[illegible]

[illegible]2[illegible]backlog[illegible]

[illegible]3[illegible]

□3□□□□□□□□□□□□□□8.1.2□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ SYNC □□□□□□□□□□□□□□□□□□□□□□□□ 2.8 □□□□□□□□SYNC□□□□□□□□□□□ PSYNC□□□□“PSYNC□□□□□□□ ID □□□□□□□□□□□”□□□□□□□ PSYNC□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□1□□□□□□□□□□□□□□□□□□□□ID□□□□□□□□ID□□□

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□□□□□□□□□□□□□□□□repl-backlog-ttl□□□1□□□

8.2 □□

8.1□□□□Redis□□□□□□□□□□□□□□□□□□□□□□□Redis□□

[illegible]

[illegible]Redis 2.8[illegible]

[illegible] Redis 2.6 [illegible]1.0[illegible]Redis 2.8[illegible] 2[illegible]

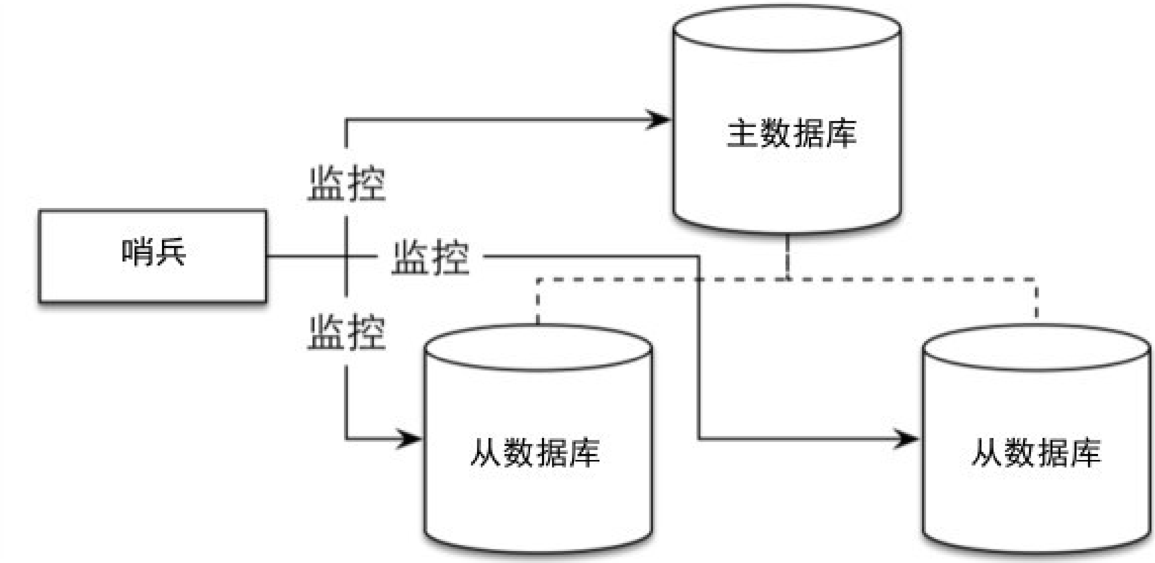
8.2.1 [illegible]

[illegible]Redis[illegible]

[illegible]1[illegible]

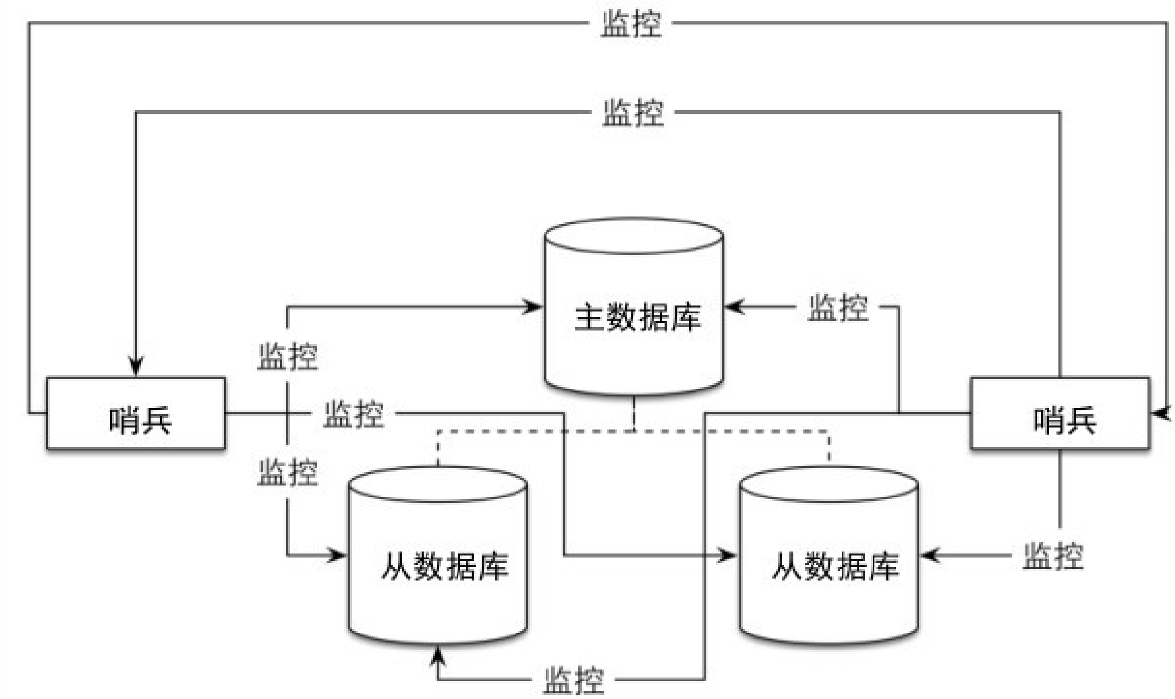
[illegible]2[illegible]

[illegible]8-3[illegible]



[illegible]8-3 [illegible]Redis [illegible]

[illegible]Redis[illegible]8-4[illegible]



[illegible]8-4 [illegible]

8.2.2 [illegible]

[illegible]8-2[illegible]8.1[illegible]3[illegible]Redis[illegible]6379[illegible]6380[illegible]6381[illegible]Redis[illegible]

[illegible]

```
redis 6379> INFO replication
# Replication
role:master
connected_slaves:2
slave0:ip=127.0.0.1,port=6380,state=online,offset=10125,lag=0
```

```
slave1:ip=127.0.0.1,port=6381,state=online,offset=10125,lag=1
```

[illegible]

```
redis 6380> INFO replication
# Replication
role:slave
master_host:127.0.0.1
master_port:6379
redis 6381> INFO replication
# Replication
role:slave
master_host:127.0.0.1
master_port:6379
```

[illegible]

[illegible]sentinel.conf[illegible]

```
sentinel monitor mymaster 127.0.0.1 6379 1
```

[illegible]mymaster[illegible]“.-_”[illegible] 3 [illegible]6379[illegible]1[illegible]Sentinel[illegible]

```
$ redis-sentinel /path/to/sentinel.conf
```

[illegible]

[illegible]

```
[71835] 19 Feb 22:32:28.730 # Sentinel runid is
e3290844c1a40469947977184 6b716c7fc830e80
```

```
[71835] 19 Feb 22:32:28.730 # +monitor master mymaster 127.0.0.1 6379 quorum 1
[71835] 19 Feb 22:33:09.997 *+slave slave 127.0.0.1:6380 127.0.0.1 6380 @ mymaster
127.0.0.1 6379
[71835] 19 Feb 22:33:30.068 *+slave slave 127.0.0.1:6381 127.0.0.1 6381 @ mymaster
127.0.0.1 6379
```

[illegible]+slave [illegible]3[illegible]Redis[illegible]6379[illegible]Redis[illegible]SHUTDOWN [illegible] 30 [illegible]

```
[71835] 19 Feb 22:36:03.780 # +sdown master mymaster 127.0.0.1 6379
[71835] 19 Feb 22:36:03.780 # +odown master mymaster 127.0.0.1 6379 #quorum 1/1
```

[illegible]+sdown[illegible]+odown[illegible]

```
[71835] 19 Feb 22:36:03.780 # +try-failover master mymaster 127.0.0.1 6379
……
[71835] 19 Feb 22:36:05.913 # +failover-end master mymaster 127.0.0.1 6379
[71835] 19 Feb 22:36:05.913 # +switch-master mymaster 127.0.0.1 6379 127.0.0.1 6380
[71835] 19 Feb 22:36:05.914 *+slave slave 127.0.0.1:6381 127.0.0.1 6381 @ mymaster
```

```
127.0.0.1 6380
[71835] 19 Feb 22:36:05.914 *+slave slave
127.0.0.1:6379 127.0.0.1 6379 @ mymaster
127.0.0.1 6380
```

+try-failover□□□□□□□□□□□□□+failover-end□□3□□□□+switch-master□□□□□□□6379□□□□□6380□□□□6380□□□□□□□□□□□□□□□□□□□□+slave□□□□□□□□□□□□□□□□□□□□□□6381□6379□□□6379□□□6379□□□□□□□□□□□□□□□□6380□□□□□□□□□□□□□□□□□□6379□□□□□□□□□□□□□□□6380□□□□□□□□□□□□□□□□□□6379□□□□□□□□□□□6380□□□□□□□□□□

□□□□□□□□□□□□Redis□□□□□□□□□□6380□6381□□□□□□□□□□□□□□

```
redis 6380> INFO replication
# Replication
role:master
connected_slaves:1
slave0:ip=127.0.0.1,port=6381,state=online,offset=270
651,lag=1
redis 6381> INFO replication
# Replication
role:slave
master_host:127.0.0.1
master_port:6380
```

□□□□6380□□□□□□□□□□□□□□□□□□□□□6381□□□□□□□□□□□□□□□□□□□□□□□□□□

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```
[71835] 19 Feb 23:46:14.573 # -sdown slave
127.0.0.1:6379 127.0.0.1 6379 @ mymaster
127.0.0.1 6380
[71835] 19 Feb 23:46:24.504 *+convert-to-slave slave
127.0.0.1:6379 127.0.0.1 6379
@ mymaster 127.0.0.1 6380
```

-sdown□□□□6379□□□□□□□□□+sdown□□□□□□+convert-to-slave□□□6379□□□□□□□□6380□□□□□□□□□□□□□□Redis□□□□□□□□6379□□□□□□□□□□□

```
redis 6379> INFO replication
# Replication
role:slave
master_host:127.0.0.1
master_port:6380
```

□□6380□□□□□□□□□□□

```
redis 6380> INFO replication
# Replication
role:master
connected_slaves:2
slave0:ip=127.0.0.1,port=6381,state=online,offset=292
948,lag=1
slave1:ip=127.0.0.1,port=6379,state=online,offset=292
948,lag=1
```

[illegible]6380[illegible]6379[illegible]

8.2.3 [illegible]

[illegible]

```
sentinel monitor master-name ip redis-port quorum
```

[illegible] master-name [illegible]“.-_”[illegible]

ip[illegible]redis-port[illegible]

quorum[illegible]

[illegible]Redis[illegible]sentinel monitor[illegible]

```
sentinel monitor mymaster 127.0.0.1 6379 2
sentinel monitor othermaster 192.168.1.3 6380 4
```

[illegible] Redis [illegible]8.2.4[illegible]

[illegible]

```
sentinel down-after-milliseconds mymaster 60000
sentinel down-after-milliseconds othermaster 10000
```

[illegible]mymaster[illegible]othermaster[illegible]down-after-milliseconds[illegible]60000[illegible]10000[illegible]

[illegible]Redis[illegible]__sentinel__:hello[illegible] INFO [illegible]4.4.4[illegible]

□□□□□□□□□□□□□□□□□□□□□□□3□□□□

□1□□10□□□□□□□□□□□□□□□□INFO□□□

□2□□ 2 □□□□□□□□□□□□□□□__sentinel__:hello □□□□□□□□□□

□3□□1□□□□□□□□□□□□□□□□□□□□□□□PING□□□

□3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□INFO□□□□□□□□□□□□□□□□□□□□□□□□□ID□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□INFO □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ INFO □□□ 10 □□□□□□□□□□□□□□□□INFO□□

□□□□□□□□□□□□__sentinel__:hello □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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□□□__sentinel__:hello□□ PING□□□

□□□PING□□□□□□□□□□□down-after-milliseconds□□□□□□down-after-milliseconds□□□□1□□□□□□□□down-after-milliseconds[illegible]PING[illegible]down-after-milliseconds[illegible]1[illegible]1[illegible]PING[illegible]

```
//[illegible] 1 [illegible] PING[illegible]
sentinel down-after-milliseconds mymaster 60000
//[illegible] 600 [illegible] PING[illegible]
sentinel down-after-milliseconds othermaster 600
```

[illegible]down-after-milliseconds[illegible]PING[illegible]subjectively down[illegible] SENTINEL is-master-down-by-addr[illegible]objectively down[illegible]quorum[illegible]

```
sentinel monitor mymaster 127.0.0.1 6379 2
```

[illegible] Sentinel [illegible]

[illegible]Raft[illegible]

[illegible]1[illegible]A[illegible]

[illegible]2[illegible]A[illegible]

[illegible]3[illegible]A[illegible]quorum[illegible]A[illegible]

[illegible]4[illegible]

[illegible]Raft[illegible]http://raftconsensus.github.io/[illegible]

[illegible]

[illegible]

[illegible]1[illegible]slave-priority[illegible]

[illegible]2[illegible]8.1.7[illegible]

[illegible]3[illegible]ID[illegible]

[illegible] SLAVEOF NO ONE[illegible]SLAVEOF[illegible]

8.2.4 [illegible]

[illegible]

[illegible]1[illegible]

[illegible]2[illegible]

[illegible]

[illegible] quorum [illegible] N/2 + 1[illegible] N [illegible]

[illegible] Redis [illegible] issue[illegible]
https://github.com/antirez/redis/issues/2257[illegible]Redis[illegible]

[illegible]

8.3 [illegible]

[illegible] Redis [illegible]Redis[illegible] Redis [illegible]

[illegible] Redis [illegible] Redis [illegible] Redis [illegible]N[illegible] 1/N[illegible]

[illegible]Redis[illegible]presharding[illegible]128[illegible]

[illegible]Redis 3.0[illegible]Cluster[illegible]——[illegible]“[illegible]”[illegible]MGET[illegible]0[illegible] SELECT[illegible]

[illegible]

8.3.1 [illegible]

[illegible]cluster-enabled[illegible]3[illegible]

[illegible]3[illegible]3[illegible] 6[illegible] Redis [illegible] cluster-enabled[illegible]

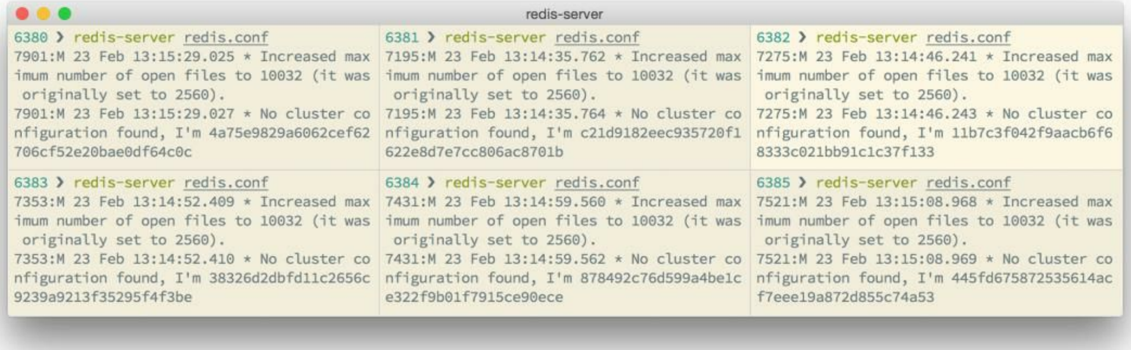
port 6380

cluster-enabled yes

[illegible]port[illegible]6[illegible]6380[illegible]6381[illegible]6382[illegible]6383[illegible]6384[illegible]6385[illegible]nodes.conf[illegible]cluster-config-file[illegible]

cluster-config-file nodes.conf

[illegible]8-5[illegible]



```
6380 ❯ redis-server redis.conf
7901:M 23 Feb 13:15:29.025 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7901:M 23 Feb 13:15:29.027 * No cluster co
nfiguration found, I'm 4a75e9829a6062cef62
706cf52e20bae0df64c0c
```

```
6381 ❯ redis-server redis.conf
7195:M 23 Feb 13:14:35.762 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7195:M 23 Feb 13:14:35.764 * No cluster co
nfiguration found, I'm c21d9182eec935720f1
622e8d7e7cc806ac8701b
```

```
6382 ❯ redis-server redis.conf
7275:M 23 Feb 13:14:46.241 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7275:M 23 Feb 13:14:46.243 * No cluster co
nfiguration found, I'm 11b7c3f042f9aacb6f6
8333c021bb91c1c37f133
```

```
6383 ❯ redis-server redis.conf
7353:M 23 Feb 13:14:52.409 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7353:M 23 Feb 13:14:52.410 * No cluster co
nfiguration found, I'm 38326d2dbfd11c2656c
9239a9213f35295f4f3be
```

```
6384 ❯ redis-server redis.conf
7431:M 23 Feb 13:14:59.560 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7431:M 23 Feb 13:14:59.562 * No cluster co
nfiguration found, I'm 878492c76d599a4be1c
e322f9b01f7915ce90ece
```

```
6385 ❯ redis-server redis.conf
7521:M 23 Feb 13:15:08.968 * Increased max
imum number of open files to 10032 (it was
 originally set to 2560).
7521:M 23 Feb 13:15:08.969 * No cluster co
nfiguration found, I'm 445fd675872535614ac
f7eee19a872d855c74a53
```

[illegible]8-5 [illegible]

[illegible]

No cluster configuration found, I'm c21d9182eec935720f1622…

□□c21d9182eec935720f1622…□□□□□□□□ID□□□ID□□□□□□□□□□□□□□□□□□ID□□□□□□□□□□□□□

□□□□□□□□Redis□□□□□□□□□□□□□□□□ INFO □□□□□□□□□□□□□□□

```
redis> INFO cluster
# Cluster
cluster_enabled:1
```

□□cluster_enabled□1□□

Redis□□□□□□□□□□□□□redis-trib.rb□□□□□□□□□□□□□□□□redis-trib.rb□□Ruby□□□□□□□□□□□□□□□□□□□□Ruby□□□□□□□□□□□□□□□□□redis-trib.rb □□□ gem □ redis□□□□□ gem install redis□□□□

□□redis-trib.rb□□□□□□□□□□□□□

```
$ /path/to/redis-trib.rb create --replicas 1 127.0.0.1:6380
127.0.0.1:6381
127.0.0.1:6382 127.0.0.1:6383 127.0.0.1:6384
127.0.0.1:6385
```

□□ create□□□□□□□□□□□--replicas 1□□□□□□□□□□□□□□□□□□1□□□□□□□□□3□6/2□□□□□□□□3□□□□□□

□□□□□redis-trib.rb□□□□□□□□

```
>>> Creating cluster
Connecting to node 127.0.0.1:6380: OK
Connecting to node 127.0.0.1:6381: OK
Connecting to node 127.0.0.1:6382: OK
Connecting to node 127.0.0.1:6383: OK
Connecting to node 127.0.0.1:6384: OK
Connecting to node 127.0.0.1:6385: OK
```

```
>>> Performing hash slots allocation on 6 nodes...
Using 3 masters:
127.0.0.1:6380
127.0.0.1:6381
127.0.0.1:6382
Adding replica 127.0.0.1:6383 to 127.0.0.1:6380
Adding replica 127.0.0.1:6384 to 127.0.0.1:6381
Adding replica 127.0.0.1:6385 to 127.0.0.1:6382
M: d4f906940d68714db787a60837f57fa496de5d12
127.0.0.1:6380 slots:0-5460 (5461 slots) master
M: b547d05c9d0e188993befec4ae5ccb430343fb4b
127.0.0.1:6381 slots:5461-10922 (5462 slots) master
M: 887fe91bf218f203194403807e0aee941e985286
127.0.0.1:6382 slots:10923-16383 (5461 slots) master
S: e0f6559be7a121498fae80d44bf18027619d9995
127.0.0.1:6383 replicates
d4f906940d68714db787a60837f57fa496de5d12
S: a61dbf654c9d9a4d45efd425350ebf720a6660fc
127.0.0.1:6384 replicates
b547d05c9d0e188993befec4ae5ccb430343fb4b
S: 551e5094789035affc489db267c8519c3a29f35d
127.0.0.1:6385 replicates
887fe91bf218f203194403807e0aee941e985286
Can I set the above configuration? (type 'yes' to accept):
```

[illegible]yes[illegible]

[illegible]redis-trib.rb[illegible]PING[illegible] INFO [illegible]ID[illegible]cluster_enabled[illegible]1[illegible]

[illegible] CLUSTER MEET[illegible] CLUSTER MEET ip port[illegible]ip[illegible]port[illegible]6[illegible]8.3.2[illegible]

[illegible]redis-trib.rb[illegible]IP[illegible]IP[illegible]

```
Using 3 masters:
127.0.0.1:6380
127.0.0.1:6381
127.0.0.1:6382
Adding replica 127.0.0.1:6383 to 127.0.0.1:6380
Adding replica 127.0.0.1:6384 to 127.0.0.1:6381
Adding replica 127.0.0.1:6385 to 127.0.0.1:6382
```

[illegible] 6380[illegible]6381 [illegible] 6382 [illegible]6383[illegible]6380[illegible]6384[illegible]6381[illegible]6385[illegible]6382[illegible]

[illegible]8.3.3[illegible] CLUSTER REPLICATE[illegible]ID[illegible] ID [illegible]

[illegible] Redis [illegible]CLUSTER NODES[illegible]6380[illegible]

```
redis 6380> CLUSTER NODES
551e5094789035affc489db267c8519c3a29f35d
127.0.0.1:6385 slave
887fe91bf218f203194403807e0aee941e985286 0
1424677377448 6 connected
```

```
    e0f6559be7a121498fae80d44bf18027619d9995
127.0.0.1:6383 slave
    d4f906940d68714db787a60837f57fa496de5d12 0
1424677381593 4 connected
    b547d05c9d0e188993befec4ae5ccb430343fb4b
127.0.0.1:6381 master - 0 1424677379515 2 connected
5461-10922
    d4f906940d68714db787a60837f57fa496de5d12
127.0.0.1:6380 myself,master - 0 0 1
    connected 0-5460
    a61dbf654c9d9a4d45efd425350ebf720a6660fc
127.0.0.1:6384 slave
    b547d05c9d0e188993befec4ae5ccb430343fb4b 0
1424677378481 5 connected
    887fe91bf218f203194403807e0aee941e985286
127.0.0.1:6382 master - 0 1424677380554 3 connected
10923-16383
```

[illegible]ID[illegible]

redis-trib.rb[illegible]Redis[illegible]redis-trib.rb[illegible]

8.3.2 [illegible]

[illegible] redis-trib.rb [illegible] CLUSTER MEET [illegible] CLUSTER MEET[illegible]A[illegible]

CLUSTER MEET ip port

ip[illegible]port[illegible]A[illegible]B[illegible]B[illegible]A[illegible]B[illegible]A[illegible]B[illegible]Gossip[illegible][3][illegible]A[illegible] MEET [illegible]

8.3.3 [illegible]

[illegible] CLUSTER REPLICATE[illegible]slot[illegible]

[illegible]16384[illegible]8.3.1[illegible]

M: d4f906940d68714db787a60837f57fa496de5d12

127.0.0.1:6380 slots:0-5460 (5461 slots) master

M: b547d05c9d0e188993befec4ae5ccb430343fb4b

127.0.0.1:6381 slots:5461-10922 (5462 slots) master

M: 887fe91bf218f203194403807e0aee941e985286

127.0.0.1:6382 slots:10923-16383 (5461 slots) master

[illegible]6380[illegible]0[illegible]5460[illegible]5461[illegible]6381[illegible]5461[illegible]10922[illegible]5462[illegible]6382[illegible]10923[illegible]16383[illegible]5461[illegible]redis-trib.rb[illegible]Redis[illegible]

[illegible]Redis [illegible]CRC16[illegible]16384[illegible]16384[illegible]CRC16[illegible]C[illegible]

[illegible]1[illegible]{[illegible]{[illegible]}[illegible]{[illegible]}[illegible]{[illegible]}[illegible]

□2□□□□□□□□□□□□□□□□□□□□□□□□

□□□□hello.world□□□□□□"hello.world"□□{user102}:last.name□□□□□□"user102"□□□□□□□□□□□□□□□□□□□□MGET□□□□□□□□□□□□□□□□□ Redis □□□{user102}:first.name □{user102}:last.name □□□□□□□□□□□□□□□□ MGET {user102}:first.name {user102}:last.name□□□□□□□□□□□

□□□

□1□□□□□□□□□□□□□□□□□□□□□□□

□2□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□ CLUSTER ADD SLOT S□□□□□□redis-trib.rb □□□□□□□□□□□□□□□□□□□□□□□CLUSTER ADDSLOTS□□□□□□□

```
CLUSTER ADDSLOTS slot1 [slot2] ... [slotN]
```

□□□ 100 □ 101 □□□□□□□□□□□□□□□□□□□□□□□CLUSTER ADDSLOTS 100 101□□□□□□□□□□□□□□□□□□□□□□

```
(error) ERR Slot 100 is already busy
```

□□□□□□ CLUSTER SLOTS□□□□□□□□□□□□□□

```
redis 6380> CLUSTER SLOTS
1) 1) (integer) 5461
   2) (integer) 10922
   3) 1) "127.0.0.1"
      2) (integer) 6381
   4) 1) "127.0.0.1"
      2) (integer) 6384
2) 1) (integer) 0
   2) (integer) 5460
```

```
    3) 1) "127.0.0.1"
       2) (integer) 6380
    4) 1) "127.0.0.1"
       2) (integer) 6383
 3) 1) (integer) 10923
    2) (integer) 16383
    3) 1) "127.0.0.1"
       2) (integer) 6382
    4) 1) "127.0.0.1"
       2) (integer) 6385
```

[illegible]3[illegible]

[illegible]2[illegible]redis-trib.rb[illegible]redis-trib.rb[illegible]6380[illegible]6381[illegible]redis-trib.rb[illegible]

[illegible]

```
$ /path/to/redis-trib.rb reshard 127.0.0.1:6380
```

[illegible]reshard[illegible]redis-trib.rb[illegible]127.0.0.1:6380[illegible]redis-trib.rb[illegible]redis-trib.rb[illegible]

```
How many slots do you want to move (from 1 to 16384)?
```

[illegible]1[illegible]redis-trib.rb[illegible]

```
What is the receiving node ID?
```

[illegible] CLUSTER NODES[illegible]6381[illegible]ID[illegible]b547d05c9d0e188993befec 4ae5ccb430343fb4b[illegible]

```
Please enter all the source node IDs.
```

```
    Type 'all' to use all the nodes as source nodes for the hash slots.
    Type 'done' once you entered all the source nodes IDs.
Source node #1:all
```

[illegible]6380[illegible]ID[illegible]done[illegible]

[illegible] yes[illegible] CLUSTER SLOTS[illegible]

```
redis 6380> CLUSTER SLOTS
1) 1) (integer) 1
   2) (integer) 5460
   3) 1) "127.0.0.1"
      2) (integer) 6380
   4) 1) "127.0.0.1"
      2) (integer) 6383
2) 1) (integer) 10923
   2) (integer) 16383
   3) 1) "127.0.0.1"
      2) (integer) 6382
   4) 1) "127.0.0.1"
      2) (integer) 6385
3) 1) (integer) 0
   2) (integer) 0
   3) 1) "127.0.0.1"
      2) (integer) 6381
   4) 1) "127.0.0.1"
      2) (integer) 6384
4) 1) (integer) 5461
```

```
   2) (integer) 10922
   3) 1) "127.0.0.1"
      2) (integer) 6381
   4) 1) "127.0.0.1"
      2) (integer) 6384
```

[illegible]0[illegible]6381[illegible]

[illegible]redis-trib.rb[illegible]redis-trib.rb[illegible]

CLUSTER SETSLOT [illegible] NODE [illegible] ID

[illegible]0[illegible]6380[illegible]

```
redis 6381> CLUSTER SETSLOT 0 NODE
d4f906940d68714db787a60837f57fa496de5d12
OK
```

[illegible] CLUSTER SLOTS [illegible] CLUSTER SETSLOT[illegible]“[illegible]”[illegible]8.3.4[illegible]

[illegible]

CLUSTER GETKEYSINSLOT [illegible]

[illegible]MIGRATE[illegible]

MIGRATE [illegible] [COPY] [REPLACE]

[illegible]COPY[illegible]REPLACE[illegible]0[illegible]0[illegible]abc[illegible]6381[illegible]6380[illegible]

```
redis 6381> MIGRATE 127.0.0.1 6380 abc 0 15999
REPLACE
```

[illegible]CLUSTER SETSLOT[illegible]“[illegible]”[illegible]“[illegible]”[illegible]redis-trib.rb[illegible]Redis[illegible]

CLUSTER SETSLOT [illegible] MIGRATING [illegible] ID

CLUSTER SETSLOT [illegible] IMPORTING [illegible] ID

[illegible]0[illegible]A[illegible]B[illegible]redis-trib.rb[illegible]

[illegible]1[illegible]B[illegible] CLUSTER SETSLOT 0 IMPORTING A[illegible]

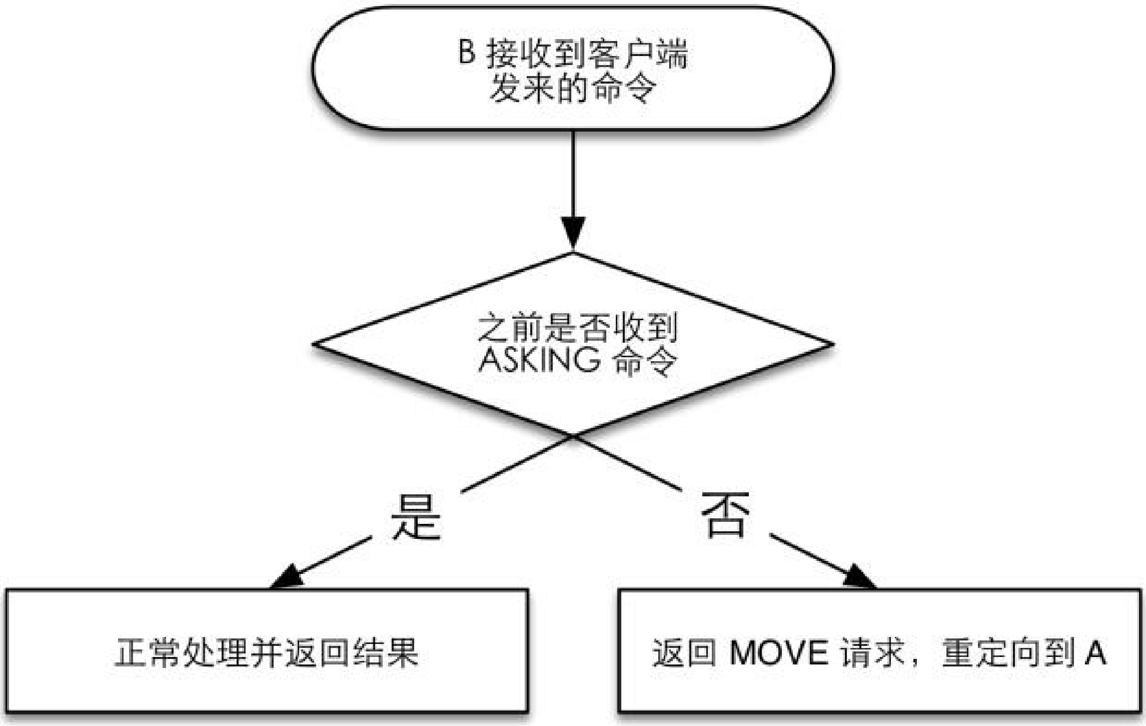
[illegible]2[illegible]A [illegible] CLUSTER SETSLOT 0 MIGRATING B[illegible]

[illegible]3[illegible] CLUSTER GETKEYSINSLOT 0[illegible]0[illegible]

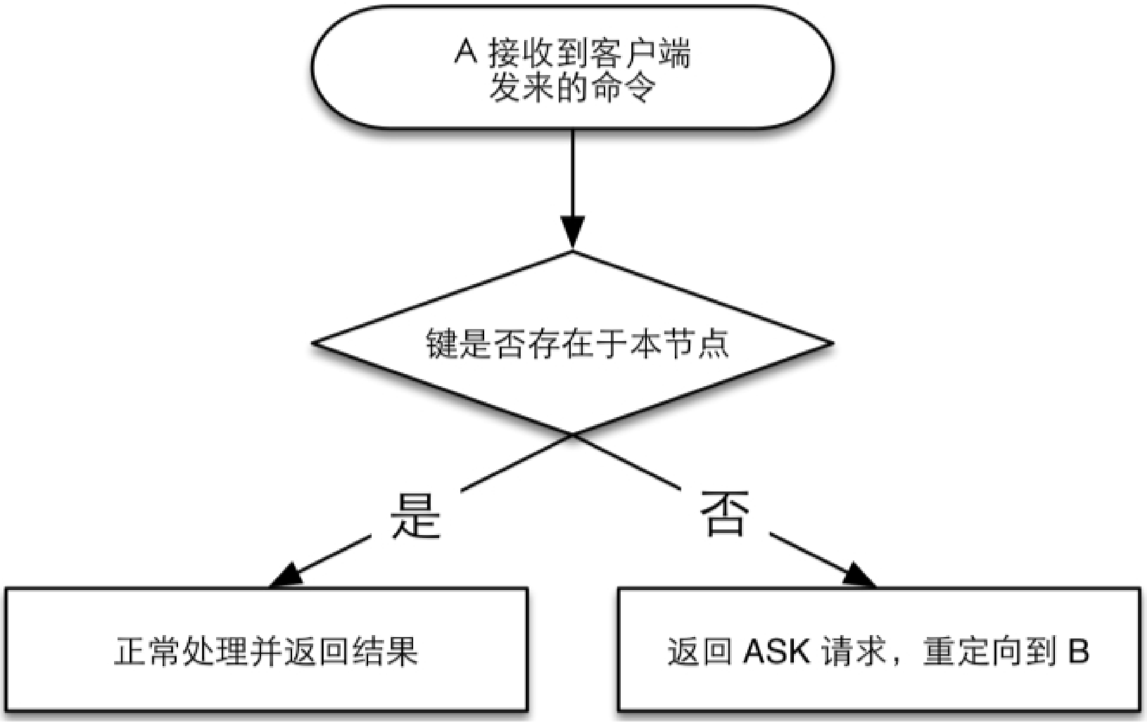
[illegible]4[illegible]3[illegible]MIGRATE[illegible]A[illegible]B[illegible]

[illegible]5[illegible] CLUSTER SETSLOT 0 NODE B[illegible]

[illegible] redis-trib.rb[illegible] 1[illegible] 2[illegible]“[illegible]”[illegible] A [illegible] 0 [illegible] ASK[illegible] B[illegible] 8-6[illegible] ASK[illegible] B[illegible] ASKING[illegible] B [illegible] 0 [illegible] ASKING [illegible] MOVED[illegible]8.3.4[illegible]8-7[illegible]ASK[illegible]“[illegible]”[illegible]


B 接收到客户端
发来的命令
之前是否收到
ASKING 命令
是
否
正常处理并返回结果
返回 MOVE 请求，重定向到 A

□8-6 A□□□□□□□□


A 接收到客户端
发来的命令
键是否存在于本节点
是
否
正常处理并返回结果
返回 ASK 请求，重定向到 B

□8-7 B □□□□□□□

8.3.4 □□□□□□□□□□

8.3.3[illegible]

[illegible] MOVE [illegible]

[illegible] Redis [illegible] MOVE[illegible] Redis [illegible]

[illegible]foo[illegible]6382[illegible]6380[illegible]foo[illegible]

```
redis 6380> SET foo bar
(error) MOVED 12182 127.0.0.1:6382
```

[illegible]MOVE[illegible]12182[illegible]foo[illegible]127.0.0.1:6382[illegible] 6382[illegible]

```
redis 6382> SET foo bar
OK
```

Redis[illegible]-c[illegible]

```
$ redis-cli -c -p 6380
reds 6380> SET foo bar
-> Redirected to slot [12182] located at 127.0.0.1:6382
OK
```

[illegible]-c[illegible]Redis[illegible]

[illegible]

[illegible]

[illegible]16384[illegible]

8.3.5 [illegible]

[illegible] PING [illegible]1[illegible]5[illegible]PING[illegible]

[illegible] PING [illegible]PFAIL[illegible]

[illegible]1[illegible]A[illegible]B[illegible]

[illegible]2[illegible]C[illegible]B[illegible]B[illegible]FAIL[illegible]B[illegible]

[illegible]Raft[illegible]

[illegible]1[illegible]A[illegible]

[illegible]2[illegible]A[illegible]

[illegible]3[illegible]A[illegible]A[illegible]

[illegible]4[illegible]

[illegible] SLAVEOF ON ONE[illegible]

[illegible]cluster-require-full-coverage[illegible]no[illegible]yes[illegible]

```
cluster-require-full-coverage no
```

[illegible]

[1]. [illegible]“[illegible]”[illegible]Redis [illegible]Redis[illegible]

[2]. Redis 2.8 [illegible] PSYNC[illegible] SYNC[illegible]8.1.7[illegible]

[3]. Gossip [illegible]

[illegible]9[illegible] [illegible]

[illegible] Redis [illegible] Redis [illegible]

[illegible] Redis [illegible]Redis[illegible]

9.1 [illegible]

Redis[illegible]Salvatore Sanfilippo[illegible]Redis[illegible][1][illegible]Redis[illegible]Redis[illegible]

9.1.1 [illegible]

Redis[illegible]“Redis[illegible]”[illegible] Redis [illegible]Redis[illegible]

Redis[illegible]IP[illegible] Redis [illegible]bind[illegible]Redis[illegible]bind[illegible]

```
bind 127.0.0.1
```

bind[illegible][2][illegible]

9.1.2 [illegible]

[illegible]requirepass[illegible]Redis[illegible]

```
requirepass TAFK(@~!ji^XALQ(sYh5xIwTn5D$s7JF
```

[illegible] Redis [illegible] Redis [illegible]

```
redis> GET foo
(error) ERR operation not permitted
```

[illegible]AUTH[illegible]

```
redis> AUTH TAFK(@~!ji^XALQ(sYh5xIwTn5D$s7JF
OK
```

[illegible]

```
redis> GET foo
"1"
```

[illegible]Redis[illegible]Redis[illegible]Redis[illegible]Redis[illegible]1[illegible]

[illegible] Redis [illegible] masterauth[illegible]AUTH[illegible]

9.1.3 [illegible]

Redis [illegible] FLUSHALL [illegible]

```
rename-command FLUSHALL oyfekmjvmwxq5a9c8usofuo369x0it2k
```

[illegible]

```
rename-command FLUSHALL ""
```

[illegible]

9.2 [illegible]

Redis[illegible]Redis[illegible]Redis[illegible]Redis[illegible]AOF[illegible] Redis [illegible]Redis[illegible]Redis[illegible]

Redis[illegible]unified request protocol[illegible] telnet [illegible]

9.2.1 [illegible]

[illegible]telnet[illegible]Redis[illegible]“EXISTS foo”[illegible]“SET foo bar”[illegible] Redis [illegible]telnet[illegible]

```
$ telnet 127.0.0.1 6379
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
SET foo bar
+OK
GET foo
$3
bar
LPUSH plist 1 2 3
:3
LRANGE plist 0 -1
```

```
*3
$1
3
$1
2
$1
1
ERRORCOMMAND
-ERR unknown command 'ERRORCOMMAND'
```

[illegible] Redis 2.4 [illegible]

```
C: SET foo 3
C: bar
S: +OK
```

[illegible]C:[illegible]S:[illegible]“[illegible]”[illegible]9.2.2[illegible]

[illegible]telnet[illegible]5[illegible]Redis[illegible]5[illegible]2.3.2[illegible]5[illegible]redis-cli[illegible]redis-cli[illegible]Redis[illegible]

1[illegible]

[illegible]error reply[illegible]-[illegible]\r\n [illegible]

```
-ERR unknown command 'ERRORCOMMAND'\r\n
```

2[illegible]

[illegible]status reply[illegible]+[illegible]\r\n [illegible]

```
+OK\r\n
```

3□□□□□

□□□□□integer reply□□:□□□□□□□□□□□□□□□\r\n □□□

:3\r\n

4□□□□□□

□□□□□□bulk reply□□$□□□□□□□□□□□□□□□□□□\r\n □□□□□□□□□

□□□□\r\n□

$3\r\nbar\r\n

□□□□□□□□□nil□□□□□$-1□□□□□□□□□□

5□□□□□□□□

□□□□□□□□multi-bulk reply□□*□□□□□□□□□□□□□□□□□□□□□\r\n□

□□□□□□□□□□□□□□□□□□□□□□

*3\r\n$1\r\n3\r\n$1\r\n2\r\n$1\r\n1\r\n

9.2.2 □□□□□□

□□□□□□□□ Redis 1.2 □□□□□□□□□□□□□□□□□□□□□□□□□□□ SET foo bar□□□□□□□□□□*3\r\n$3\r\nSET\r\n$3\r\nfoo\r\n$3 \r\nbar\r\n□□□□□telnet□□□□□

```
$ telnet 127.0.0.1 6379
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
*3
$3
SET
$3
foo
```

```
$3
bar
+OK
```

[illegible]

Redis[illegible]AOF[illegible]Redis[illegible]telnet[illegible]Redis[illegible]

9.3 [illegible]

[illegible] Redis [illegible] Redis [illegible]

9.3.1 redis-cli

[illegible] redis-cli [illegible] Redis [illegible] Redis[illegible]Redis[illegible]redis-cli[illegible]

redis-cli[illegible]Redis[illegible]INFO[illegible]CONFIG[illegible]RDB[illegible]SAVE[illegible]Redis[illegible]

1[illegible]

[illegible]Redis[illegible]slow log[illegible] slowlog-log-slower-than[illegible]1 000 000 [illegible]1[illegible]10 000[illegible] slowlog-max-len [illegible]

[illegible] SLOWLOG GET[illegible]

```
redis> SLOWLOG GET
```

```
1) 1) (integer) 4
   2) (integer) 1356806413
   3) (integer) 58
   4) 1) "get"
      2) "foo"
2) 1) (integer) 3
   2) (integer) 1356806408
   3) (integer) 34
   4) 1) "set"
      2) "foo"
      3) "bar"
```

[illegible]4[illegible]

[illegible]1[illegible]ID[illegible]

[illegible]2[illegible]Unix[illegible]

[illegible]3[illegible]

[illegible]4[illegible]

[illegible] [illegible] slowlog-log-slower-than[illegible]0[illegible]

2[illegible]

Redis[illegible]MONITOR[illegible]Redis[illegible]redis-cli[illegible]redis-cli[illegible]MONITOR[illegible]

```
redis> MONITOR
OK
```

[illegible] Redis [illegible] redis-cli [illegible] redis-cli[illegible] SET foo bar[illegible]redis-cli[illegible]

```
1356806981.885237 [0 127.0.0.1:57339] "SET" "foo" "bar
```

MONITOR□□□□□□Redis□□□□□□□□□□□MONITOR□□□□□Redis□□□□□□□□□□□□MONITOR□□□□□□□□□□□□□

□□□□ Instagram[3] □□□□□□□□□ MONITOR □□□ Redis □□□□□□redis-faina□redis-faina□□□□MONITOR□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□

redis-faina □□□□□□ https://github.com/Instagram/redis-faina□□□□□□□□redis-faina.py□□□□□□□

redis-faina.py□□□□□□□□□□MONITOR□□□□□□□□□

```
redis-cli MONITOR | head -n <□□□□□□□> | ./redis-faina.py
```

9.3.2 phpRedisAdmin

□Redis □□□□□□□□□redis-cli□□□□□□□□□□□□□□□□MySQL□□□□□□□phpMyAdmin□□□Redis□□□□□PHP□□□□□□□□□□phpRedis Admin□phpRedisAdmin □□□□□□□□□□□□□□□□□□□□/□□□□□□□□□□□□□□□□□□□□□□□□□

1□□□phpRedisAdmin

□□phpRedisAdmin□□□□□□

```
git clone https://github.com/ErikDubbelboer/phpRedisAdmin.git
cd phpRedisAdmin
```

phpRedisAdmin□□PHP□Redis□□□Predis□□□□□□□□□□□□□□□□Predis□

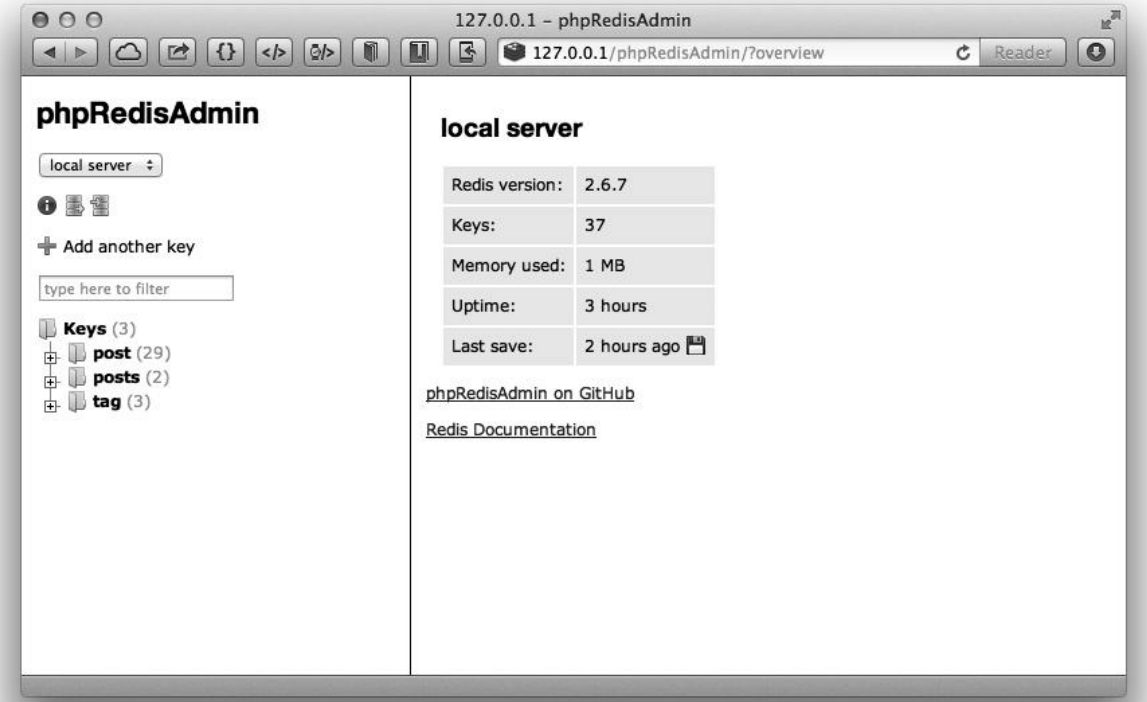
```
git submodule init
git submodule update
```

2□□□□□□□□

 phpRedisAdmin Redis
phpRedisAdmin 127.0.0.16379includesconfig.inc. php

3phpRedisAdmin

PHPWebNginxphpRedisAdmin9-1

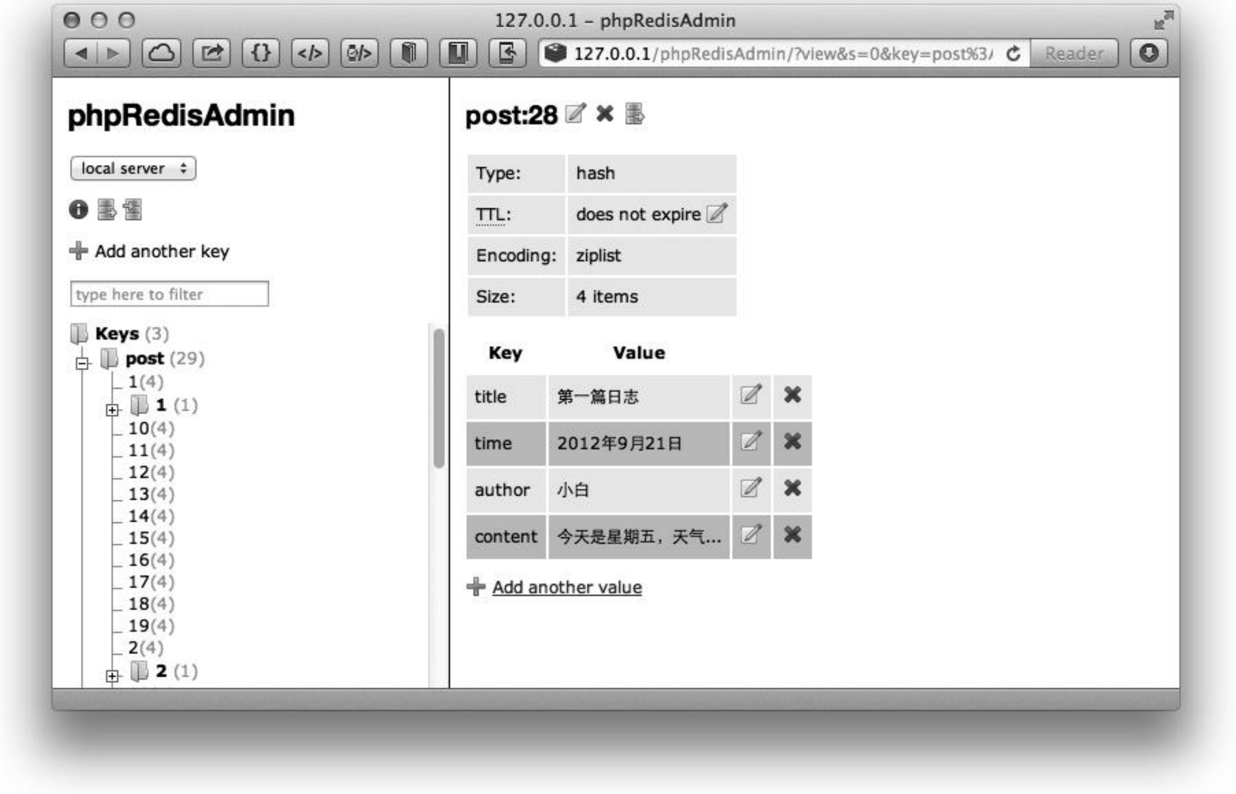


Redis version: 2.6.7
Keys: 37
Memory used: 1 MB
Uptime: 3 hours
Last save: 2 hours ago

9-1 phpRedisAdmin

phpRedisAdminRedis“:”post:1post:2post

9-2



Type:	hash
TTL:	does not expire
Encoding:	ziplist
Size:	4 items

Key	Value
title	第一篇日志
time	2012年9月21日
author	小白
content	今天是星期五，天气...

□9-2 □□□□□

4□□□

phpRedisAdmin□□□□□□□□□□□KEYS*□□□□□□□□□□□□TYPE□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Redis□□□□□□□□□□□□□□□□□ KEYS *□□□□□□□□□□□□□□□Redis □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□phpRedisAdmin□□□

9.3.3 Rdbtools

Rdbtools □□□Redis □□□□□□□□□□□□□□□□□□□□JSON □□□□□□□Redis □□□□□□□□□□□□□Rdbtools □□□ Python □□□□□□□□□https://github.com/sripathikrishnan/redis-rdb-tools□

1□□□Rdbtools

□□□□□□□□Rdbtools□

```
git clone https://github.com/sripathikrishnan/redis-rdb-tools
cd redis-rdb-tools
sudo python setup.py install
```

2[illegible]

[illegible]RDB[illegible]SAVE[illegible]Redis[illegible]

3[illegible]JSON[illegible]

[illegible]Rdbtools[illegible]JSON[illegible]

```
rdb --command json /path/to/dump.rdb > output_filename.json
```

[illegible]/path/to/dump.rdb[illegible]output_filename.json[illegible]

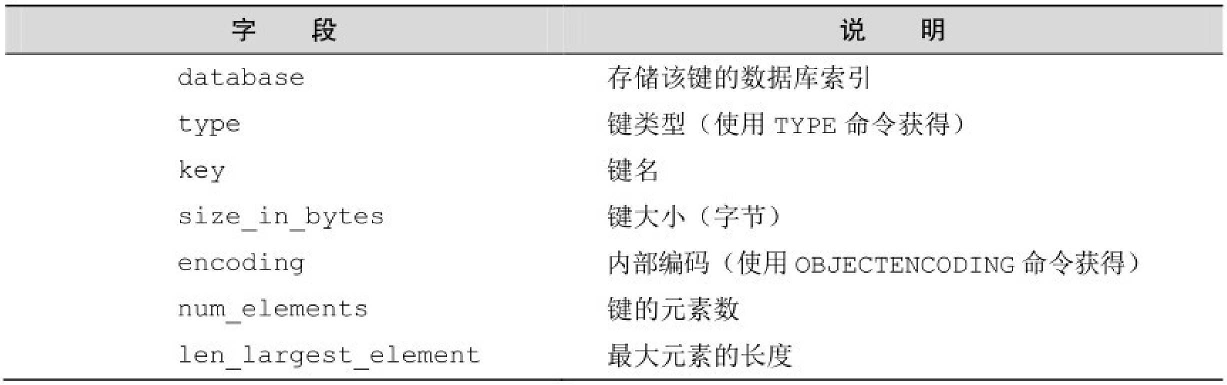
4[illegible]

Rdbtools[illegible]CSV[illegible]CSV[illegible]Excel[illegible]Redis[illegible]

```
rdb -c memory /path/to/dump.rdb > output_filename.csv
```

[illegible]CSV[illegible]9-1[illegible]

[illegible]9-1 Rdbtools [illegible]CSV[illegible]



字　段	说　明
database	存储该键的数据库索引
type	键类型（使用 TYPE 命令获得）
key	键名
size_in_bytes	键大小（字节）
encoding	内部编码（使用 OBJECTENCODING 命令获得）
num_elements	键的元素数
len_largest_element	最大元素的长度

[illegible]

[1]. http://oldblog.antirez.com/post/redis-manifesto.html

[2]. Redis [illegible]2.8 [illegible]https://github.com/antirez/redis/issues/274[illegible]

[3]. Instagram□Facebook□□□□□□□□□□□

[illegible]A Redis[illegible]

Redis [illegible]

A.1 REDIS_CMD_WRITE

[illegible]REDIS_CMD_WRITE [illegible]Redis[illegible]REDIS_CMD_WRITE[illegible]Lua[illegible]REDIS_CMD_RANDOM[illegible]A.4[illegible]REDIS_CMD_WRITE [illegible]“Write commands not allowed after non deterministic commands.”

[illegible]REDIS_CMD_WRITE[illegible]

SET

SETNX

SETEX

PSETEX

APPEND

DEL

SETBIT

SETRANGE

INCR

DECR

RPUSH
LPUSH
RPUSHX
LPUSHX
LINSERT
RPOP
LPOP
BRPOP
BRPOPLPUSH
BLPOP
LSET
LTRIM
LREM
RPOPLPUSH
SADD
SREM
SMOVE
SPOP
SINTERSTORE
SUNIONSTORE
SDIFFSTORE
ZADD
ZINCRBY
ZREM
ZREMRANGEBYSCORE
ZREMRANGEBYRANK
ZUNIONSTORE

ZINTERSTORE
HSET
HSETNX
HMSET
HINCRBY
HINCRBYFLOAT
HDEL
INCRBY
DECRBY
INCRBYFLOAT
GETSET
MSET
MSETNX
MOVE
RENAME
RENAMENX
EXPIRE
EXPIREAT
PEXPIRE
PEXPIREAT
FLUSHDB
FLUSHALL
SORT
PERSIST
RESTORE
MIGRATE
BITOP

A.2 REDIS_CMD_DENYOOM

[illegible] REDIS_CMD_DENYOOM [illegible] Redis [illegible] REDIS_CMD_WRITE [illegible]DEL [illegible] REDIS_ CMD_WRITE [illegible] REDIS_CMD_DENYOOM[illegible]

[illegible]maxmemory [illegible] maxmemory-policy [illegible]Redis [illegible] REDIS_CMD_DENYOOM[illegible]

[illegible] [illegible] REDIS_CMD_DENYOOM [illegible]SET [illegible]Redis[illegible] REDIS_CMD_DENYOOM [illegible]

[illegible]REDIS_CMD_DENYOOM[illegible]

SET

SETNX

SETEX

PSETEX

APPEND

SETBIT

SETRANGE

INCR

DECR

RPUSH

LPUSH

RPUSHX

LPUSHX

LINSERT
BRPOPLPUSH
LSET
RPOPLPUSH
SADD
SINTERSTORE
SUNIONSTORE
SDIFFSTORE
ZADD
ZINCRBY
ZUNIONSTORE
ZINTERSTORE
HSET
HSETNX
HMSET
HINCRBY
HINCRBYFLOAT
INCRBY
DECRBY
INCRBYFLOAT
GETSET
MSET
MSETNX
SORT
RESTORE
BITOP

A.3 REDIS_CMD_NOSCRIPT

□□REDIS_CMD_NOSCRIPT□□□□□□□□Redis□□□□□□

□□ EVAL □ EVALSHA □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□REDIS_CMD_NOSCRIPT□□□□□□□□

BRPOP

BRPOPLPUSH

BLPOP

SPOP

AUTH

SAVE

MULTI

EXEC

DISCARD

SYNC

REPLCONF

MONITOR

SLAVEOF

DEBUG

SUBSCRIBE

UNSUBSCRIBE

PSUBSCRIBE

PUNSUBSCRIBE

WATCH

UNWATCH

EVAL

EVALSHA

SCRIPT

A.4 REDIS_CMD_RANDOM

□□□□□□□□□□ REDIS_CMD_RANDOM □□□□□□□□□□□□□□ REDIS_CMD_WRITE□□□□□□□□6.4.2□□□□□

□□REDIS_CMD_RANDOM□□□□□□

SPOP

SRANDMEMBER

RANDOMKEY

TIME

A.5 REDIS_CMD_SORT_FOR_SCRIPT

□□REDIS_CMD_SORT_FOR_SCRIPT□□□□□□□□□□□□□□6.4.2□□□□□□□□□□□□□□Redis□□□□□□□□□

□□REDIS_CMD_SORT_FOR_SCRIPT□□□□□□□□

SINTER

SUNION

SDIFF

SMEMBERS

HKEYS

HVALS

KEYS

A.6 REDIS_CMD_LOADING

□Redis□□□□□□□□□□□□□□□□□□□□Redis□□□□□□REDIS_CMD_LOADING□□□□□□

□□REDIS_CMD_LOADING□□□□□□□□

INFO

SUBSCRIBE

UNSUBSCRIBE

PSUBSCRIBE

PUNSUBSCRIBE

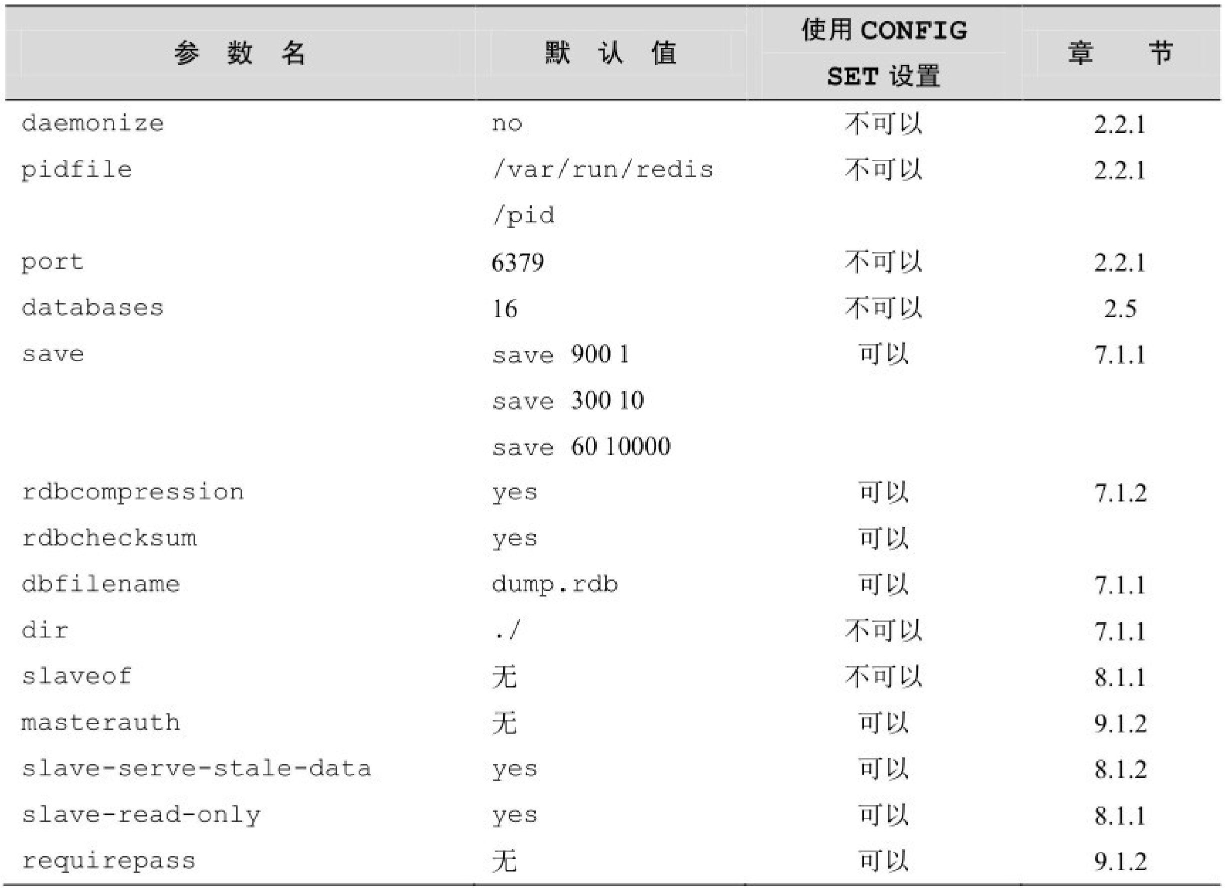
PUBLISH

2.6.11□□□□□AUTH□2.6.12□□□□□SELECT□

[illegible]B [illegible]

[illegible]Redis[illegible]B-1[illegible]

[illegible]B-1 Redis [illegible]



参数名	默认值	使用 CONFIG SET 设置	章节
daemonize	no	不可以	2.2.1
pidfile	/var/run/redis /pid	不可以	2.2.1
port	6379	不可以	2.2.1
databases	16	不可以	2.5
save	save 900 1 save 300 10 save 60 10000	可以	7.1.1
rdbcompression	yes	可以	7.1.2
rdbchecksum	yes	可以	
dbfilename	dump.rdb	可以	7.1.1
dir	./	不可以	7.1.1
slaveof	无	不可以	8.1.1
masterauth	无	可以	9.1.2
slave-serve-stale-data	yes	可以	8.1.2
slave-read-only	yes	可以	8.1.1
requirepass	无	可以	9.1.2

[illegible]

参数名	默认值	使用 CONFIG SET 设置	章节
rename-command	无	不可以	9.1.3
maxmemory	无	可以	4.2.4
maxmemory-policy	volatile-lru	可以	4.2.4
maxmemory-samples	3	可以	4.2.4
appendonly	no	可以	7.1.2
appendfsync	everysec	可以	7.1.2
auto-aof-rewrite-percentage	100	可以	7.1.2
auto-aof-rewrite-min-size	64mb	可以	7.1.2
lua-time-limit	5000	可以	6.4.4
slowlog-log-slower-than	10000	可以	9.3.1
slowlog-max-len	128	可以	9.3.1
hash-max-ziplist-entries	512	可以	4.6.2
hash-max-ziplist-value	64	可以	4.6.2
list-max-ziplist-entries	512	可以	4.6.2
list-max-ziplist-value	64	可以	4.6.2
set-max-intset-entries	512	可以	4.6.2
zset-max-ziplist-entries	128	可以	4.6.2
zset-max-ziplist-value	64	可以	4.6.2

□□C CRC16□□□□

Redis □□□□CRC16 □□□□□□□□□□□□□□ slot □□□□□□□ANSI C□□□□□□□□□□□□□Cluster□□□□□□□□□□□□□□□□□□□□Redis□□□□□http://redis.io□□

/*

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* ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT

* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS

```
 * SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
 */
/* CRC16 implementation according to CCITT standards.
 *
 * Note by @antirez: this is actually the XMODEM CRC 16 algorithm, using the
 * following parameters:
 *
 * Name                : "XMODEM", also known as "ZMODEM", "CRC-16/ACORN"
 * Width               : 16 bit
 * Poly                : 1021 (That is actually x^16 + x^12 + x^5 + 1)
 * Initialization      : 0000
 * Reflect Input byte      : False
 * Reflect Output CRC      : False
 * Xor constant to output CRC : 0000
 * Output for "123456789"   : 31C3
 */
static const uint16_t crc16tab[256]= {
0x0000,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,
0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,
0x1231,0x0210,0x3273,0x2252,0x52b5,0x4294,0x72f7,0x62d6,
    0x9339,0x8318,0xb37b,0xa35a,0xd3bd,0xc39c,0xf3ff,0xe3de,
    0x2462,0x3443,0x0420,0x1401,0x64e6,0x74c7,0x44a4,0x5485,
    0xa56a,0xb54b,0x8528,0x9509,0xe5ee,0xf5cf,0xc5ac,0xd58d,
    0x3653,0x2672,0x1611,0x0630,0x76d7,0x66f6,0x5695,0x46b4,
    0xb75b,0xa77a,0x9719,0x8738,0xf7df,0xe7fe,0xd79d,0xc7bc,
    0x48c4,0x58e5,0x6886,0x78a7,0x0840,0x1861,0x2802,0x3823,
    0xc9cc,0xd9ed,0xe98e,0xf9af,0x8948,0x9969,0xa90a,0xb92b,
    0x5af5,0x4ad4,0x7ab7,0x6a96,0x1a71,0x0a50,0x3a33,0x2a12,
    0xdbfd,0xcbdc,0xfbbf,0xeb9e,0x9b79,0x8b58,0xbb3b,0xab1a,
    0x6ca6,0x7c87,0x4ce4,0x5cc5,0x2c22,0x3c03,0x0c60,0x1c41,
    0xedae,0xfd8f,0xcdec,0xddcd,0xad2a,0xbd0b,0x8d68,0x9d49,
    0x7e97,0x6eb6,0x5ed5,0x4ef4,0x3e13,0x2e32,0x1e51,0x0e70,
    0xff9f,0xefbe,0xdfdd,0xcffc,0xbf1b,0xaf3a,0x9f59,0x8f78,
        0x9188,0x81a9,0xb1ca,0xa1eb,0xd10c,0xc12d,0xf14e,0xe16f,
        0x1080,0x00a1,0x30c2,0x20e3,0x5004,0x4025,0x7046,0x6067,
        0x83b9,0x9398,0xa3fb,0xb3da,0xc33d,0xd31c,0xe37f,0xf35e,
        0x02b1,0x1290,0x22f3,0x32d2,0x4235,0x5214,0x6277,0x7256,
        0xb5ea,0xa5cb,0x95a8,0x8589,0xf56e,0xe54f,0xd52c,0xc50d,
        0x34e2,0x24c3,0x14a0,0x0481,0x7466,0x6447,0x5424,0x4405,
        0xa7db,0xb7fa,0x8799,0x97b8,0xe75f,0xf77e,0xc71d,0xd73c,
        0x26d3,0x36f2,0x0691,0x16b0,0x6657,0x7676,0x4615,0x5634,
        0xd94c,0xc96d,0xf90e,0xe92f,0x99c8,0x89e9,0xb98a,0xa9ab,
        0x5844,0x4865,0x7806,0x6827,0x18c0,0x08e1,0x3882,0x28a3,
        0xcb7d,0xdb5c,0xeb3f,0xfb1e,0x8bf9,0x9bd8,0xabbb,0xbb9a,
        0x4a75,0x5a54,0x6a37,0x7a16,0x0af1,0x1ad0,0x2ab3,0x3a92,
        0xfd2e,0xed0f,0xdd6c,0xcd4d,0xbdaa,0xad8b,0x9de8,0x8dc9,
    0x7c26,0x6c07,0x5c64,0x4c45,0x3ca2,0x2c83,0x1ce0,
0x0cc1,
    0xef1f,0xff3e,0xcf5d,0xdf7c,0xaf9b,0xbfba,0x8fd9,0x9ff
8,
      0x6e17,0x7e36,0x4e55,0x5e74,0x2e93,0x3eb2,0x0ed
  1,0x1ef0
    };
    uint16_t crc16(const char *buf, int len) {
      int counter;
      uint16_t crc = 0;
      for (counter = 0; counter < len; counter++)
        crc = (crc<<8) ^ crc16tab[((crc>>8) ^
    *buf++)&0x00FF];
      return crc;
    }
```